ANNEXURE - 1

GOVERNMENT OF KARNATAKA

No:DMG/MLS/AUC/'C'-2563/2018-19

Office of the Director
Department of Mines and Geology,
KhanijaBhavan, Race Course Road
Bangalore-1, Date: 06.10.2018
Email id: dir-mines@karnataka.gov.in

To,
MSPL Limited
Baldota bhavan, 117,
Maharshi Karve Road,
Mumbai – 400 020.

Sub: Letter of Intent with reference to e-auction dated **05.09.2018** for grant of iron ore mining lease for "**M/s Kanhaiyalal Dudheria, ML No: 2563**" Block in Ramanadurga village, Sandur Taluka, Ballari District over an extent of 30.09 Hectare Area of Forest land.

1. Background:

1.1. The Director, Department of Mines and Geology, Karnataka, pursuant to the Supreme Court judgments and orders in Samaj Parivartana Samudaya and Ors. Vs. State of Karnataka and Ors in W.P.(C) 562 of 2009 (the "**Judgment**"), the Mines and Minerals (Development and Regulation) Act, 1957 and its amendments (the "**Act**") and the Mineral (Auction) Rules, 2015 including its amendments (the "**Rules**"), issued the notification and notice inviting tender dated 30 January 2018 for grant of mining lease for "**M/s Kanhaiyalal Dudheria, ML No: 2563**" located in Ramanadurga village, Sandur Taluka, Ballari District of Karnataka (the "**Tender Document**"). The e-auction process was conducted in accordance with the Mineral (Auction) Rules, 2015 (including its amendments) and the Tender Document for the said mineral block and "**MSPL Limited**" was declared as the **"Preferred Bidder"** in accordance with Rule 9(9)(iii) of the Mineral (Auction) Rules, 2015 including its amendments.

6/10/18

1.2. The upfront payment for " **M/s Kanhaiyalal Dudheria, ML No: 2563**" Block is **Rs. 4,51,73,153/- (Rupees Four Crore Fifty One Lakhs Seventy Three Thousand One Hundred and Fifty Three Only).** As required under Rule 10(1) of the Mineral (Auction) Rules, 2015, **MSPL Limited** has deposited the first instalment of the upfront payment, being ten percent of the upfront payment, of Rs.**45,17,315/-** through Demand Draft (DD) bearing No. 986159 dated: 20.09.2018 which was received on 24.09.2018.

1.3. With reference to letter No. DMG/MLS/CCA/12/2016-17 dated 23.08.2018 issued by DMG during the bid evaluation stage and thereupon the declaration submitted, **MSPL Limited** has submitted the revised bid security on 24.09.2018 for maintaining bid validity as 510 days from the Bid Due Date (i.e. 20th August 2018).

2. Grant of Letter of Intent

2.1. Accordingly, pursuant to Rule 10(2) of the Mineral (Auction) Rules, 2015 including its amendments, the Government of Karnataka is issuing this letter of intent for grant of mining lease for " **M/s Kanhaiyalal Dudheria, ML No: 2563**" Block in Ramanadurga village, Sandur Taluka, Ballari District over an extent of 30.09 Hectare Area of Forest land to **MSPL Limited**.

3. Conditions

3.1. This letter of intent and the subsequent grant of aforementioned mining lease shall be subject to the provisions of the Judgment, Act and the rules made thereunder, as amended from time to time.

3.2. **MSPL Limited** shall be declared as the **"Successful Bidder"** and subsequently be granted the mining lease only upon satisfactory completion of all requirements under the Judgment, Act, rules made thereunder and the Tender Document.

6/10/18

3.3. For reference, the current requirements under the Rules and the Tender Document for declaration of **MSPL Limited** as the **"Successful Bidder"** and subsequent grant of the mining lease are reiterated below. It is clarified that the requirements mentioned below are only for reference and in the event of any change in Applicable Law, the requirements under the modified law, shall be applicable.

(a) Declaration of the **"Successful Bidder"**:

MSPL Limited shall be considered to be the **"Successful Bidder"** upon:

i. continuing to be in compliance with all the terms and conditions of eligibility;

ii. payment of the second instalment of the Upfront Payment which is **Rs 45,17,315/- (Rupees Forty Five Lakhs Seventeen Thousand Three Hundred and Fifteen Only)**, as per the Tender Document;

iii. furnishing the **Performance Security** pursuant to the Auction Rules, valid for the period specified in the Tender Document and Mine Development and Production Agreement (MDPA), for an amount equal to **Rs. 4,51,73,153/- (Rupees Four Crore Fifty One Lakhs Seventy Three Thousand One Hundred and Fifty Three Only).** Pursuant to sub-rule (1) of Rule 12 of the Auction Rules, the Performance Security shall be adjusted every five years so that it continues to correspond to 0.50% of the reassessed value of estimated resources including the value of any newly discovered mineral that may be included in the mining lease deed on its discovery determined in accordance with the Auction Rules. In such case, bank guarantee constituting the Performance Security shall be substituted with another bank guarantee of the same value issued in accordance with Clause 10.2 of the Tender Document, which is for the revised amount or if the Performance Security has been provided through a security deposit, additional amount towards security deposit shall be provided;

iv. satisfying the conditions specified in clause (b) of sub-section (2) of section 5 of the Act with respect to a mining plan;

6/10/18

v. having cleared all dues to the Government of Karnataka arising from mining activity that the Preferred Bidder has undertaken in Karnataka in the past, if such dues have been determined to be payable by him in terms of the extant provisions of the MMDR Act, 1957 and the rules framed there under, along with an undertaking that he shall also clear all dues that the Government of Karnataka determines in future, payable by him in terms of the extant provisions of the MMDR Act, 1957 and the rules framed there under, to the Government of Karnataka arising from mining activity undertaken by him in Karnataka in the past, if such dues have not been determined; and

vi. having paid the actual expenses incurred by the Government of Karnataka on mine exploration, preparation of Provisional R&R Plans, survey, construction of pillars and DGPS survey within **60** days of issue of letter of intent. This amount is equal to **Rs 3,72,73,751/-(Rupees Three Crore Seventy Two Lakhs Seventy Three Thousand Seven Hundred and Fifty One Only).**

The above activities shall be completed by the Preferred Bidder in accordance with the timelines mentioned in the Tender Document.

(b) Signing of the Mine Development and Production Agreement (MDPA)

MSPL Limited shall sign the Mine Development and Production Agreement with the Government of Karnataka upon obtaining all consents, approvals, permits, no-objections and the like as may be required under Applicable Laws for commencement of mining operations.

(c) Grant of mining lease

Subsequent to execution of the MDPA, **MSPL Limited** shall pay the **third instalment** of the Upfront Payment which is **Rs. 3,61,38,522/- (Rupees Three Crore Sixty One Lakhs Thirty Eight Thousand Five Hundred and Twenty Two Only)**. Upon such payment, the Government of Karnataka shall issue a grant order and thereafter within a period of 30 days a mining lease shall be executed in favour of **MSPL Limited** as per Rule 10(6) of The Mineral (Auction) Rules, 2015 . The date of the commencement of the period for which a mining lease is granted shall be the date on which a duly executed mining lease is registered.

6/10/18

4. Validity

4.1. This letter of intent is valid for a period of **30 months** from the date of its issuance, within which time all the above conditions must be fulfilled and the Mining Lease Deed must be executed between **MSPL Limited** and the Government of Karnataka. In case **MSPL Limited** is unable to fulfil all or any of the above conditions, then it may submit an application to Government of Karnataka, requesting for further extension. It is in the sole discretion of the Government of Karnataka to extend the validity of this letter of intent after **MSPL Limited** submits the reasons/justification for non-compliance with any of the conditions; which shall be due to events beyond the control of **MSPL Limited.**

4.2. If the Government of Karnataka is satisfied that a longer period is required to enable **MSPL Limited** to satisfy all or any of the above conditions, it may extend the validity of this letter of intent for such period or periods as the Government of Karnataka may specify.

4.3. It is amply clarified that **MSPL Limited** is obligated to make Annual Payments as per the provisions of the Tender Document.

Kindly return the duplicate copy of this Letter of Intent duly signed by authorized signatory of the Company and furnish a suitable Board Resolution in token of having accepted the above terms and conditions. The accepted copy of Letter of Intent along with Board resolution should be submitted latest by 22.10.2018.

DIRECTOR
Department of Mines & Geology. 6/10/2018

ANNEXURE - 2

सत्यमेव जयते

CENTRAL EMPOWERED COMMITTEE

Constituted by the Hon'ble SUPREME COURT OF INDIA

F.No. 2-61/CEC/SC/2017-Pt.III **Dated : 21st August 2019**

To

The Chief Secretary
Government of Karnataka
Vidhan Soudha,
Bengaluru- 560001

Sub : Preparation and implementation of the Reclamation and Rehabilitation Plan of the mining lease falling in District Bellary, Karnataka

Sir

The CEC hereby gives its concurrence to the Reclamation and Rehabilitation Plan of the following mining leases, prepared by the ICFRE with the permissible annual production of iron ore shown against their names :

S.No.	Name of the Mining Lease	ML No.	Permissible annual production of Iron Ore Mine
1.	M/s. MSPL Ltd. erstwhile M/s. H.G. Rangan Goud	2148	**0.77 MMT**
2.	M/s. MSPL Ltd. erstwhile Kanhiyalal Dudheria	2563	**0.23 MMT**

It is requested that immediate action may please be taken for the implementation of these Reclamation and Rehabilitation Plans.

2nd Floor, Chanakya Bhawan, Chanakya Puri, New Delhi-21 Tel : 011-21610612, 21610613, 26884921, 26884923
Fax : 24101925, Email : cecindia202@gmail.com

It may please be ensured that the mining activities are permitted to be undertaken only after compliance of the Hon'ble Supreme Court orders and in accordance with the stipulated conditions.

Yours faithfully

(Amarnatha Shetty)
Member Secretary

Copy to:

i) Addl. Chief Secretary (Forest), Government of Karnataka, Bangalore.
ii) Secretary (Mines), Government of Karnataka, Bangalore.
iii) Principal Chief Conservator of Forests, Karnataka Forest Department, Bangalore.
iv) Director, Mines and Geology, Government of Karnataka. It is requested that a copy of the approved R & R Plan may please be provided to the concerned lessee and the IBM.
v) All Members and Additional Members of the Monitoring Committee with the request to undertake immediate follow up action for the implementation of the R & R Plan.
vi) Director General, Indian Council for Forestry and Education, Dehradun.
vii) Controller of Mines (SZ), Indian Bureau of Mines, Bangalore.
viii) Secretary General, Federation of Indian Mines Industries.

MONITORING COMMITTEE

No.MC/R&R/CCA/2563/2019-20/117

Khanija Bhavan, Race Course Road,
Bangalore-1, date: 31.08.2019.

3/01

-3 SEP 2019.

NOTICE

Sub: Concurrence of CEC on final Rehabilitation & Reclamation Plan-intimation reg.

Ref.1: Letter of CEC No.2-61/CEC/SC/2017-Pt.III, dated 21st August 2019.
2: LOI issued to the Preferred Bidder dated 06.10.2018.
3: Letter of Director, DMG dated 30.08.2019.

*****

The ICFRE has submitted the final Rehabilitation & Reclamation Plan of Ramdev Iron ore Mine of erstwhile lessee M/s Kanheyalal Dudheriya now auctioned to M/s MSPL and the same has been approved by the Central Empowered Committee vide letter cited above in the reference 1 recommending the annual production of iron ore as below:

Name of the Mining Lease	ML No.	Permissible annual production of iron ore mine
M/s MSPL Ltd. Erstwhile Kanheyalal Dudheria.	2563	0.23 MMT

The Monitoring Committee has also been informed by the Director, Department of Mines and Geology vide reference 2 above that the you have been declared as Preferred Bidder for the said mine by submitting the highest bid in the auction conducted by the Government of Karnataka. Accordingly, Letter of Intent has also been issued to you on 06.10.2018. As per the orders of the Hon'ble Supreme Court, the R&R Plan proposed by ICFRE and approved by the CEC shall have to be implemented before starting of mining operations. You are requested to start implementation of the R&R Plan only after obtaining approval from the Director, DMG. You are also directed to submit one copy of the approved Mining Plan, Environmental Clearance, approval under the Forest (Conservation) Act, 1980, and other statutory clearances in tune with the annual production of 0.23 MMT.

Chairman,
Monitoring Committee

To,
M/s M/s MSPL Ltd.,
Baldota Enclave, Abheraj Baldota Road,

Hospet - 583203.

Copy to,

1. Director, Department of Mines & Geology, Bangalore for information and necessary action.
2. Regional Controller of Mines, IBM, No.29 Industrial Suburb, II Stage, Tumkur Road, Goruguntepalya, Yeshwanthpur, Bangalore for information and necessary action.

ANNEXURE - 3

BALDOTA

MSPL LIMITED

Corp. Office : Baldota Enclave, Abheraj Baldota Road, Hospet-583203. Karnataka. India.
Office : +91 8394 232002, 232003 Fax: +91 8394 232333, 232444
Email: email@mspllimited.com url: www.mspllimited.com

Regd. Office : Baldota Bhavan, 117, Maharshi Karve Road, Mumbai-400020. India.
Tel: +91 22 22030989 Fax: +91 22 22019762 Email: mspl.mum@mspllimited.com

CERTIFIED TRUE COPY EXTRACTS OF MINUTES OF MEETING OF COMMITTEE OF DIRECTORS OF MSPL LIMITED HELD ON 11th MAY 2010

In supersession of resolution passed by the Board of Directors at the meeting held on 14th November 2009 it is hereby **RESOLVED THAT** Sri. Narendrakumar A. Baldota, Chairman and Managing Director, Sri. Rahul Kumar N. Baldota, Sri. Shrenik Kumar N. Baldota, Executive Directors of the Company, Sri. Meda Venkataiah, Executive Director, Sri V. G. Subhramaniam, Vice President (Legal), Sri.Arvind Mathur, Vice President (Business Development) and Dr.Shibbin Kumar Bhushan, Authorised Representative of the Company be and hereby severally authorized to file applications for mineral concessions [Reconnaissance Permit (RP) Prospecting License (PL) Mining Lease (ML)], to pursue these applications, to swear affidavits and other documents needed for the purpose, to appear in hearings and to represent the Company, to file Revisions, to file Writs and other legal proceedings in connection with these applications and to do everything necessary and incidental in this behalf, and also to do everything necessary and incidental in other legal proceedings in all other matters for and on behalf of the Company."

FOR MSPL LIMITED

06/06/2016

(K. CHANDRA SEKHAR NAIDU)
COMPANY SECRETARY
ACS 16684

भारत गणराज्य REPUBLIC OF INDIA

सत्यमेव जयते

इसके द्वारा, भारत गणराज्य के राष्ट्रपति के नाम पर, उन सभी से जिनका इससे संबंध हो, अनुरोध एवं अपेक्षा की जाती है कि वे धारक को बिना किसी रोक-टोक के स्वतंत्र रूप से आने-जाने दें, और उसे हर तरह की ऐसी सहायता और सुरक्षा प्रदान करें जिसकी उसे आवश्यकता हो।

THESE ARE TO REQUEST AND REQUIRE IN THE NAME OF THE PRESIDENT OF THE REPUBLIC OF INDIA ALL THOSE WHOM IT MAY CONCERN TO ALLOW THE BEARER TO PASS FREELY WITHOUT LET OR HINDRANCE AND TO AFFORD HIM OR HER EVERY ASSISTANCE AND PROTECTION OF WHICH HE OR SHE MAY STAND IN NEED.

भारत गणराज्य के राष्ट्रपति के आदेश से

BY ORDER OF THE PRESIDENT OF THE REPUBLIC OF INDIA

आर. अमरजोती R. Amarjothi
अधीक्षक Superintendent
क्षेत्रीय पासपोर्ट कार्यालय, बेंगलूर
Regional Passport Office, Bangalore

1

भारत गणराज्य REPUBLIC OF INDIA

प्रकार / Type: P	पासपोर्ट सं. / Passport No.: H9925018
उपनाम / Surname: MEDA	देश कोड / Country Code: IND
दिया गया नाम / Given Name(s): VENKATAIAH	
राष्ट्रीयता / Nationality: INDIAN	लिंग / Sex: M
जन्मस्थान / Place of Birth: UDAYAGIRI ANDHRA PRADESH	जन्मतिथि / Date of Birth: 02/07/1945
जारी करने का स्थान / Place of Issue: BANGALORE	
जारी करने की तिथि / Date of Issue: 01/03/2010	पासपोर्ट की तिथि / Date of Expiry: 29/02/2020

P<INDMEDA<<VENKATAIAH<<<<<<<<<<<<<<<<<<<<<<<<
H9925018<5IND4507024M2002293<<<<<<<<<<<<<<02

THIS PASSPORT IS THE PROPERTY OF THE GOVERNMENT OF INDIA. ANY COMMUNICATION RECEIVED BY THE HOLDER FROM A PASSPORT AUTHORITY REGARDING THIS PASSPORT, INCLUDING DEMAND FOR ITS SURRENDER, SHOULD BE COMPLIED WITH IMMEDIATELY.

THIS PASSPORT SHOULD NOT BE SENT OUT OF ANY COUNTRY BY POST. THIS SHOULD BE IN THE CUSTODY EITHER OF THE HOLDER OR OF A PERSON AUTHORISED BY THE HOLDER. IT MUST NOT BE ALTERED OR MUTILATED IN ANY WAY.

LOSS, THEFT OR DESTRUCTION OF THIS PASSPORT SHOULD BE IMMEDIATELY REPORTED TO THE NEAREST PASSPORT AUTHORITY IN INDIA OR IF THE HOLDER IS ABROAD, TO THE NEAREST INDIAN MISSION/POST AND TO THE LOCAL POLICE. ONLY AFTER EXHAUSTIVE ENQUIRIES SHALL A DUPLICATE PASSPORT BE ISSUED.

36

CAUTION

INDIAN CITIZENS RESIDENT ABROAD ARE ADVISED TO REGISTER THEMSELVES AT THE NEAREST INDIAN MISSION/POST.

REGISTRATION

पिता / कानूनी अभिभावक का नाम / Name of Father / Legal Guardian
MEDA OBAYYA

माता का नाम / Name of Mother
MEDA SUBBAMMA

पति या पत्नी का नाम / Name of Spouse
MEDA LALITHA

पता / Address
O B A 1019 1 2ND CROSS
N J NAGAR HOSPET
BELLARY KARNATAKA 583203

पुराने पासपोर्ट का नं., जारी करने की तिथि एवं स्थान / Old Passport No. with Date and Place of Issue
A8795784 15/05/2000 BANGALORE

फाईल नं. / File No.
BNGE00398710 - OLD PPT CANCELLED AND RETURNED

पृष्ठांकन

विदेशों में रहने वाले भारतीय नागरिकों को सलाह दी जाती है कि वे निकटतम भारतीय मिशन/केन्द्र में अपना पंजीकरण करवाएं।

चेतावनी

यह पासपोर्ट भारत सरकार की सम्पत्ति है। इस पासपोर्ट के बारे में किसी पासपोर्ट अधिकारी से इसके धारक को यदि कोई सूचना मिलती है जिसमें पासपोर्ट लौटाने की मांग भी शामिल है तो उसका तुरंत अनुपालन किया जाए।

यह पासपोर्ट डाक द्वारा किसी भी देश से बाहर न भेजा जाए। यह पासपोर्ट धारक या उसके द्वारा प्राधिकृत व्यक्ति के कब्जे में ही होना चाहिए। इसमें किसी भी प्रकार का फेरबदल या विकृति नहीं की जानी चाहिए।

पासपोर्ट गुम हो जाने, चोरी हो जाने अथवा नष्ट हो जाने पर उसकी सूचना भारत में सबसे निकटतम पासपोर्ट अधिकारी को अथवा यदि पासपोर्ट धारक विदेश में है तो निकटतम भारतीय मिशन/केन्द्र और स्थानीय पुलिस को तत्काल दी जानी चाहिए। विस्तृत पूछताछ के बाद ही डुप्लीकेट पासपोर्ट जारी किया जाएगा।

REGISTRATION

INDIAN CITIZENS RESIDENT ABROAD ARE ADVISED TO REGISTER THEMSELVES AT THE NEAREST INDIAN MISSION/POST.

CAUTION

THIS PASSPORT IS THE PROPERTY OF THE GOVERNMENT OF INDIA. ANY COMMUNICATION RECEIVED BY THE HOLDER FROM A PASSPORT AUTHORITY REGARDING THIS PASSPORT, INCLUDING DEMAND FOR ITS SURRENDER, SHOULD BE COMPLIED WITH IMMEDIATELY.

THIS PASSPORT SHOULD NOT BE SENT OUT OF ANY COUNTRY BY POST. THIS SHOULD BE IN THE CUSTODY EITHER OF THE HOLDER OR OF A PERSON AUTHORISED BY THE HOLDER. IT MUST NOT BE ALTERED OR MUTILATED IN ANY WAY.

LOSS, THEFT OR DESTRUCTION OF THIS PASSPORT SHOULD BE IMMEDIATELY REPORTED TO THE NEAREST PASSPORT AUTHORITY IN INDIA OR IF THE HOLDER IS ABROAD, TO THE NEAREST INDIAN MISSION/POST AND TO THE LOCAL POLICE. ONLY AFTER EXHAUSTIVE ENQUIRIES SHALL A DUPLICATE PASSPORT BE ISSUED.

36

पिता / कानूनी अभिभावक का नाम / Name of Father / Legal Guardian

NARENDRA KUMAR ABHERAJ BALDOTA

माता का नाम / Name of Mother

CHITRA NARENDRA KUMAR BALDOTA

पति या पत्नी का नाम / Name of Spouse

LAVINA RAHUL BALDOTA

पता / Address

CHINAR BALDOTA COLONY

HOSPET BELLARY DIST

KARNATAKA 583203

पुराने पासपोर्ट का नं. और इसके जारी होने की तिथि एवं स्थान / Old Passport No. with Date and Place of Issue

F9606006 23/08/2006 BANGALORE

फाईल सं./File No.

BNGH01815508

Form I. R.

Certificate of Incorporation

No. 12160 of 1961-62.

I hereby certify that MINERAL SALES PRIVATE LIMITED is this day incorporated under the Companies Act, 1956 (No. 1 of 1956) and that the Company is Limited.

Given under my hand at BOMBAY this EIGHTEENTH day of OCTOBER One thousand nine hundred and SIXTY ONE. (26th Asvina, 1883)

The Seal of the Registrar of Company Maharashtra.

(S. K. DUTT)
Registrar of Companies,
Maharashtra.

Form I.R.

CERTIFICATE OF INCORPORATION

No. 12160 of 19 61-62.

I hereby certify that MINERAL SALES ~~PRIVATE~~ LIMITED

Word "Private" deleted u/s 43-A (1), 43-A (1A), 43-A (1B) & 43-A (1C) from the name of Company w.e.f. 1-7-92

is this day incorporated under the Companies Act, 1956 (No. 1 of 1956) and that the Company is Limited.

AROC.

Given under my hand at BOMBAY this EIGHTEENTH day of OCTOBER One thousand nine hundred and SIXTY ONE. (26th Asvina, 1883)

सत्यमेव जयते

(S.K. Dutt)
Registrar of Companies.
Maharashtra.

MFP—1037—(C-1092)—19-8-57—15,000.

TRUE EXTRACT

Asst. Registrar of Companies
Maharashtra, Bombay

No. 11-12160.

FRESH CERTIFICATE OF INCORPORATION CONSEQUENT ON CHANGE OF NAME

IN THE OFFICE OF THE REGISTRAR OF COMPANIES, MAHARASHTRA, MUMBAI.

In the matter of MINERAL SALES LIMITED. (*)

I hereby approve and signify in writing under Section 21 of the Companies Act, 1956 (Act of 1956) read with the Government of India, Department of Company Affairs, Notification No. G.S.R. 507E dated the 24th June 1985 the change of name of the Company.

from MINERAL SALES LIMITED (*)

to MSPL LIMITED (*)

and I hereby certify that MINERAL SALES LIMITED (*)

which was originally incorporated on Eighteenth day of Oct. 1961 under the Companies Act, 1956 and under the name having MINERAL SALES PRIVATE LIMITED duly passed the necessary resolution in terms of section 21/~~XXX(X)~~ of the Companies Act, 1956 the name of the said Company is this day changed to MSPL LIMITED (*) and this certificate is issued pursuant to Section 23(1) of the said Act/

Given under my hand at MUMBAI this Fifteenth day of December, one thousand nine hundred ninety - eight.

(RAM MURTY)
Asstt. Registrar of Companies
Maharashtra, Mumbai.

(*Deemed Public Company U/s.43A.

THE SEAL OF COMPANY REGISTRAR OF COMPANIES

CERTIFIED TRUE COPY

Asstt. Registrar of Companies
Asstt. Maharashtra, Mumbai

BALDOTA
WE ARE LIFE

MSPL LIMITED

Corp. Office : Baldota Enclave, Abheraj Baldota Road, Hosapete - 583203. Karnataka. India.
Office : +91 8394 232002, 232003, Fax : +91 8394 232333, 232444
Email : email@mspllimited.com url : www.mspllimited.com

Regd. Office : Baldota Bhavan, 117, Maharshi Karve Road, Mumbai - 400020. India.
Tel : +91 22 22030989 Fax : +91 22 22019762 Email : mspl.mum@mspllimited.com
CIN U13100MH1961PLC012160

MSPL LIMITED
CIN: U13100MH1961PLC012160

LIST OF DIRECTORS AS ON 09.10.2017

SL	DIN	NAME OF THE DIRECTOR	ADDRESS & PHONE NO.	DESIGNATION	CONTACT NO.	E-MAIL ID.
1	00130619	Mr. Narendrakumar A Baldota	"CHINAR" Baldota Colony, Dam Road Hosapete – 583 203, Karnataka, India PH:08394 - 232003	Chairman & Managing Director	9901012345	na.baldota@mspllimited.com
2	00130764	Mr. Rahul Kumar N Baldota	"CHINAR" Baldota Colony, Dam Road Hosapete – 583 203, Karnataka, India PH:08394 - 232002	Joint Managing Director	9880145678	rahulbaldota@mspllimited.com
3	00130831	Mr. Shrenik Kumar N Baldota	"CHINAR" Baldota Colony, Dam Road Hosapete – 583 203, Karnataka, India PH:08394 - 232005	Joint Managing Director	9741112345	sn.baldota@mspllimited.com
4	06404575	Dr. Meda Venkataiah	"OBA", No. 1019-1 2nd Cross, M J Nagar Hosapete – 583 203 Karnataka, India PH:08394 - 232007	Whole Time Director	9900256797	meda.venkataiah@mspllimited.com
5	00143273	Mr. Ramakrishna Hemappa Sawkar	No. 292, 5th Block, 38th Cross, Jayanagar Bangalore – 560 041 Karnataka, India PH:08394 -232003	Independent Director	9900256793	gsocind@gmail.com
6	01086790	Mr. Madhava Ravindra	Flat 1 B, PGP Manor, 29, Barnaby Road, Kilpauk, Chennai – 600 010 Tamil Nadu, India PH:08394 - 232007	Independent Director	9884208964	satkudi@yahoo.com

//Certified True Copy//
For MSPL LIMITED

(K. CHANDRA SEKHAR NAIDU)
COMPANY SECRETARY
ACS 16684

BALDOTA
WE ARE LIFE

MSPL LIMITED

Corp. Office : Baldota Enclave, Abheraj Baldota Road, Hospet-583203. Karnataka. India.
Office : +91 8394 232002, 232003 Fax: +91 8394 232333, 232444
Email: email@mspllimited.com url: www.mspllimited.com

Regd. Office : Baldota Bhavan, 117, Maharshi Karve Road, Mumbai-400020. India.
Tel: +91 22 22030989 Fax: +91 22 22019762 Email: mspl.mum@mspllimited.com
CIN U13100MH1961PLC012160

Date: 08.06.2016

QUALIFICATION AND PROFESSIONAL EXPERIENCE OF Sri. S.SHIVAKUMAR, FOR PREPARATION OF MINING PLANS/SCHEME OF MINING

This is certify that S.Shivakumar. M Sc. Geology, has been working in Vyasanakere Iron Ore Mine since 01.04.1994. At present he is working as Assistant General Manager (Exploration) for the past 5 years.

He is having vast experience in exploration works , Mineral Concession applications processes and preparation of Mining Plan/Scheme of Mining as prescribed by the IBM.

Dr. Meda Venkataiah

Executive Director (Mining)

1

Reg. No. 148

№ 2050

GULBARGA UNIVERSITY, GULBARGA.

Certificate Of Passing

This is to Certify that

Shri/~~Smt.~~ Shetty Shivakumar

Passed the M. Sc. Final Geology

Examination held by the Gulbarga University in the month of May 1983

and was placed in the First Class.

GULBARGA

Dated : 18-6-1984

CONTROLLER OF EXAMINATIONS
Controller of Examinations
Gulbarga University
Gulbarga-585 106.

2

No. 1020

GULBARGA UNIVERSITY, GULBARGA

CERTIFICATE Showing the number of marks obtained by

Shri/Smt. Shetty Shivakumar in each head of passing

at the II year M.Sc. / ~~II year D.D.E.~~ / ~~II year M.A.Sc.~~ / ~~III year M.A.Sc~~ Examination held in May 1983

HEADS OF PASSING

Regd. No.	Subject	Maximum Marks	Minimum for Passing	Marks Obtained in figrs	Marks Obtained in words	Remarks
148	Geology					
Paper 1	Hydrogeology	75	26	51	Fifty one	
Paper II	Exploration Geophysics & Geochemistry	75	26	53	Fifty three	
Paper III	I.M.D, Ore genesis & Ore microscopy	75	26	43	Forty three	
Paper IV	Engg. Geol., Surveying, Elem. of mining & Miner. Econ.	75	26	42	Forty two	First class
		—	—	—		
Practical 1	Hydrogeology, Oresk Ore microscopy and Geophysics	75	26	40	Forty only	
Practical II	Geochemistry, Surveying and Mine valuation	50	17	38	Thirty eight	
Viva, Lab records & Tour report		25	—	20	Twenty only	
Total		450	180	287	Two hundred eighty seven	
Previous Marks		450	180	276	Two hundred Seventy six	
Grand Total		900	360	563	Five hundred sixty three	

Received Rs 5/-

'X' Indicates exemptions earned in previous attempts

* Graced under Ordinance .....

Gulbarga, Prepared by.....

Date 2-8-1983 Checked by.....

CONTROLLER OF EXAMINATIONS

3

ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ

ಗುಲಬರ್ಗಾ

ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಕುಲಾಧಿಪತಿ,
ಕುಲಪತಿ ಹಾಗೂ ಸೆನೆಟ್ ಸದಸ್ಯರಾದ ನಾವು

ಶ್ರೀ ಶಿವಕುಮಾರ ಈಶ್ವರಪ್ಪ ಶೆಟ್ಟಿ

ಅವರು ಮಾಸ್ಟರ್ ಆಫ್ ಸಯನ್ಸ್ (ಭೂಗರ್ಭಶಾಸ್ತ್ರ)
ಪದವಿ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಪ್ರಥಮ ವರ್ಗದಲ್ಲಿ
ಉತ್ತೀರ್ಣರಾದುದರಿಂದ ಅವರಿಗೆ

ಮಾಸ್ಟರ್ ಆಫ್ ಸಯನ್ಸ್

(ಭೂಗರ್ಭಶಾಸ್ತ್ರ)

ಪದವಿಯನ್ನು ಗುಲಬರ್ಗಾದಲ್ಲಿ ಒಂದು ಸಾವಿರದ ಒಂಬತ್ತು
ನೂರ ಎಂಬತ್ತೈದನೆಯ ಖಿಸ್ತಿಲ್ ಎಂಟರಂದು ನೀಡಿದ್ದೇವೆ.
ಈ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಮುದ್ರೆ ಮತ್ತು ಕುಲಪತಿಗಳ
ರುಜುಗಳಿಂದ ಇದನ್ನು ಪ್ರಮಾಣೀಕರಿಸಲಾಗಿದೆ.

We, the Chancellor, Vice-Chancellor
and Members of the Senate of
the Gulbarga University

Certify that

Sri. Shivakumar Eswarappa Shetty

having been examined for the Degree of Master of Science (Geology) and adjudged to have passed the examination in the First Class the Degree of

MASTER OF SCIENCE

(GEOLOGY)

has been conferred on him/her at Gulbarga on the Eighth day of the month of April in the year One thousand nine hundred and eightyfive.

In Testimony whereof are set the seal of the said University and the signature of the Vice-Chancellor.

ಕುಲಪತಿ/Vice-Chancellor

GULBARGA UNIVERSITY

GEOLOGICAL REPORT ON ESTIMATION OF IRON ORE RESERVES IN RESPECT OF

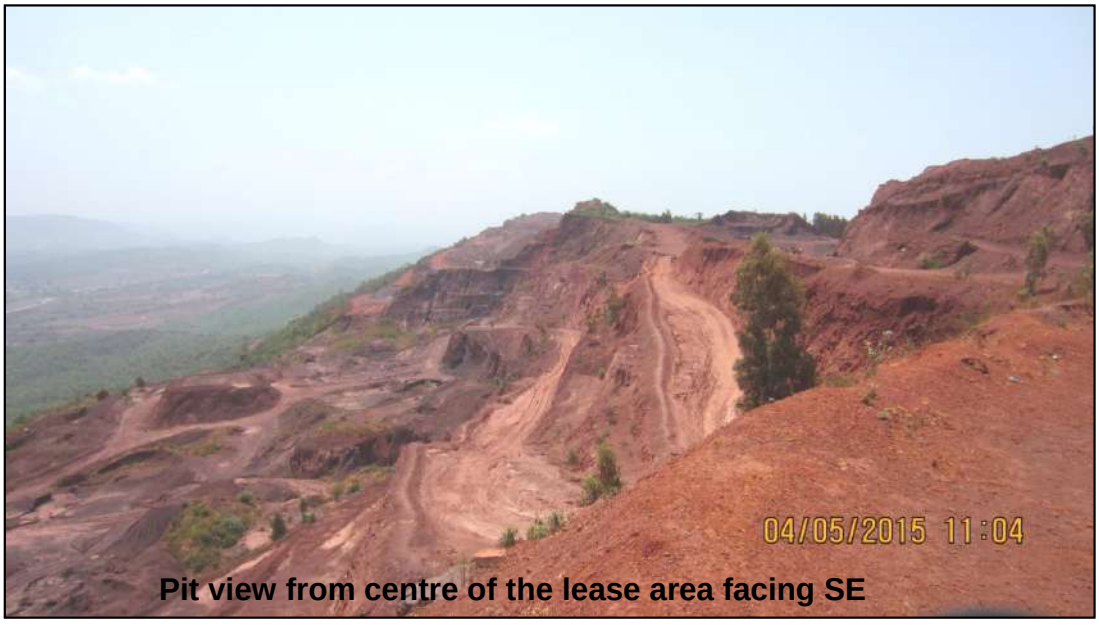
M/s KANHAIYALAL DUDHERIA

MINE LEASE AREA

(ML NO. 2563)

DISTRICT : BALLARI, KARNATAKA

TEXT, ANNEXURE AND PLATES



Pit view from centre of the lease area facing SE

A Mini-Ratna Company

MINERAL EXPLORATION CORPORATION LIMITED
(A Government of India Enterprise)
Dr. Babasaheb Ambedkar Bhavan,
High Land Drive Road, Seminary Hills,
NAGPUR-440 006

APRIL - 2016

GEOLOGICAL REPORT ON
ESTIMATION OF IRON ORE RESERVES IN RESPECT OF
M/s KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No.2563)
RAMGAD RANGE, SANDUR SCHIST BELT
DISTRICT: BALLARI, KARNATAKA

LIST OF CONTENTS

CHAPTER NO.	CONTENTS	PAGE NO.
	SALIENT FEATURES	**i-iii**
	CHAPTER-1	**1-3**
1.0.0	**INTRODUCTION**	1
1.1.0	General	1
1.2.0	Location	2
1.3.0	Accessibility	2
1.4.0	Physiography	2
1.5.0	Climate	3
1.6.0	Scope of Work	3
1.7.0	Acknowledgements	3
	CHAPTER-2	**4-10**
2.0.0	**REGIONAL GEOLOGY AND STRUCTURE**	4
2.1.0	Background Information	4
2.2.0	Classification of Iron Ore Deposits	5
2.3.0	Regional Geology	7
2.4.0	Structure	7
2.5.0	Geology of the Area	8
2.6.0	Structural Control	9
2.7.0	Geology and structure of the mine lease area	9
	CHAPTER-3	**11-16**
3.0.0	**EXPLORATION BY MECL**	11
3.1.0	Objective	11
3.2.0	Summary of Exploration work done	11
3.3.0	Surface Survey	11
3.4.0	Geological Mapping	12
3.5.0	Bulk density determination	12
3.6.0	Lumps and Fines	13
3.7.0	Broken up area	14
3.8.0	Mineralised/non mineralised area	14
3.9.0	Exploratory Drilling	14
3.10.0	Core Logging	14
3.11.0	Primary Sampling	18
3.12.0	Specific Gravity Determination	18

CHAPTER NO.	CONTENTS	PAGE NO.
3.13.0	Comparative study of bulk density	19
3.14.0	Petrographic studies	19
3.15.0	Mineragraphic studies	19
	CHAPTER-4	
4.0.0	**MINERALISATION AND CHARACTERISTICS OF IRON ORE**	**20-23**
4.1.0	Mineralisation	20
4.2.0	Types of Ores	20
4.3.0	Grade Classification	21
4.4.0	Depth Persistence	23
4.5.0	Mineralisation Factor	24
4.6.0	Physical Characteristics of Ore	24
4.7.0	Chemical Characteristics of the Iron Ore	24
	CHAPTER-5	**25-28**
5.0.0	**METHOD OF RESOURCE ESTIMATION**	25
5.1.0	Resource estimation by geological cross-section	25
5.2.0	Grade Classification	25
5.3.0	Shape of Ore body	26
5.4.0	Geometry Of The Ore Body	26
5.5.0	Estimation of Reserves / Resources and Grade	28
	CHAPTER-6	**31-36**
6.0.0	**RELIABILITY OF ESTIMATION**	31
6.1.0	Frequency Distribution	31
6.2.0	Accuracy of Analytical Procedure	31
6.3.0	Grade,tonnage and curve	35
	CHAPTER-7	**37**
7.0.0	**CONCLUSIONS AND RECOMMENDATIONS**	37
7.1.0	Conclusions	37
7.2.0	Recommendations	37
PART-IVA	**REPORTING OF MINERAL RESOURCES**	**1-3**

GEOLOGICAL REPORT ON
ESTIMATION OF IRON ORE RESERVES IN RESPECT OF
M/s KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No.2563),
DISTRICT: BALLARI, KARNATAKA

LIST OF ANNEXURE

Annexure No	TITLE	Page No
I	Details of Triangulation Stations	1-31
II	Details of Survey particulars of boreholes drilled by MECL	1
IIIA	Detailed Litholog of boreholes drilled (core drilling)	1-13
IIB	Detailed Litholog and analytical details of boreholes (Reverse Circulation drilling)	1-43
IV	Analytical Results of Primary Samples (Core Drilling)	1-8
V	Details of Concise Litholog of boreholes	1-21
VIA	Details of Petrographic Study	1
VIB	Details of Mineragraphic Study	1

LIST OF TABLES

TABLE NO.	TITLE	PAGE No.
1	Quantum of work executed in M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563)	3
2	Details of Iron Ore zones Intersected in the Boreholes (at 45% Fe cut-off)	21
3	Details of Iron Ore zones Intersected in the Boreholes (at 55% Fe cut-off)	22
4	Estimation of ore reserves by cross section method at 35% Fe cut-off	23
5	Section-wise - borehole-wise ore reserves by cross section method (at 45 % Fe cut-off)	29
6	Section-wise - borehole-wise ore reserves by cross section method (at 55 % Fe cutoff)	30
7	Geo-statistical assessment of Ore tonnage and Metal recoveries	35

LIST OF PLATES

PLATE No.	TITLE	R.F.
I	Location Plan	1 : 200000
II	Regional Geological Map	1 : 100000
III	Topographic and Geological Map M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563)	1 : 1000
IV	Graphic Lithologs with Histograms	1 : 500
VA	Geological Cross Sections (S1-S1' to S6 - S-6')	1 : 1000
VB	Geological Cross Sections (S7-S7' to S10-S10')	1 : 1000
VC	Geological Cross Sections (S11-S11' to S14-S14')	1 : 1000

LIST OF TEXT PLATES

TEXT PLATE NO.	TITLE	PAGE NO.
1	Iron Ore Deposits of India	6
2	Typical geological cross section	27
3	Histogram of primary samples values-Fe	32
4	Histogram of primary samples values- SiO_2	32
5	Histogram of primary samples values- Al_2O_3	33
6	Cumulative frequency plot on log probability graph- Fe	33
7	Cumulative frequency plot on log probability graph- SiO_2	34
8	Cumulative frequency plot on log probability graph- Al_2O_3	34
9	Grade tonnage curve	35

GEOLOGICAL REPORT ON
ESTIMATION OF IRON ORE RESERVES IN RESPECT OF
M/s KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No.2563),
RAMGAD RANGE, SANDUR SCHIST BELT
DISTRICT: BALLARI, KARNATAKA

SALIENT FEATURES

1	Name and location of the block	M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) Sandur Taluk, Dist: Ballari, Karnataka, lies between Longitudes 76º25'02.00" and 76º26'06.3" and Latitudes 15º10'07.8" and 15º10'37.3". The block falls in Ramanadurga village of Ramgad range. The block is covered in Survey of India Toposheet No.57 A/8.
2	Accessibility	The mine lease area is 20 km from Sandur town which can be approached from Ballari, Hospet and from Toranagallu railway station.
3	Scope of work	i) Borehole fixation, determination of boreholes co-ordinates and reduced levels ii) Detailed geological mapping iii) Estimation of reserves / resources in respect of 'C' category mines as per UNFC guidelines iv) Lumps and fines ratio v) Broken up and non broken up (virgin) area vi) Ore and non-mineralized area vii) Associated minerals if any with quantification as per threshold values. viii) In accordance with "Mineral (Evidence of Mineral Contents) Rules 2015".
4	**Quantum of work** a) Geological Mapping b) i) Core drilling ii) RC drilling c) Total Meterage drilled d) **Chemical Analysis** i) Primary (Fe, SiO_2, Al_2O_3,) ii) Bulk Density iii) Specific gravity iv) Lumps and Fines (Pits)	 0.3009 sq. km (1:1000 RF) 233.30m (4 Bhs) 1045.00m (15 Bhs) 1278.30m (19 Bhs) Coring - 172 Nos. RC - 1019 Nos. 2Nos. 4 Nos. 2 Nos.
5	Duration of work	During February 2016; Analysis was completed in the month of March 2016
6	Geology and structure	The Sandur Schist Belt is known for its economic deposits of Iron and Manganese and studied in detail by many prominent workers like New Bold (1838), Foote (1895), Roy and Biswas(1983), Martin and Mukhopadhyay (1987 and 1993), Naqvi et.al. (1987) on various aspects like depositional environment, structure etc. Iron ore, banded ferruginous cherty quartzite, are intimately associated with gabbro of pre-tectonic and post tectonic origin. The hill ranges trend in NNW-SSE

		direction, which are similar to regional tectonic trend of the Sandur Schist Belt. The area has under gone two phases of deformation [F1 and F2] and metamorphism. The axial trace of F1 have NNW-SSE trend which is refolded by open F2 folds trending in ENW-WSE direction. The primary structure of banded iron ore formation is bedding and pene-contemporaneous faults; schistosity and fracture cleavage are also common. Repetitions of iron ore bands, which cause the thickening of ore at places, are due to diastrophic folds. The rock type belongs to Ramanamala formation which includes pillow- structured and undifferentiated meta basites, including meta gabbro, greywacke, banded iron formation and undifferentiated banded ferruginous chert with or without grunerite.
7	No. of BHs drilled up to basement	Nil ; Grid pattern : 100 x 100m in mineralized zone and 200 x 200m in other areas.
8	Highest RL in lease area Lowest RL in lease area Deepest BH drilled : a) Depth wise b) Mineralisation wise	914.00m (NNW of MKDR-13) 762.00m (NNE of MKDR-11) MKDR-15, RL-725.306m and total depth 105.00m Highly siliceous (enriched BHQ) ore-97.76m / 37.38% Fe (MKDR-15)
9	True Thickness range at 45% Fe cut-off	Minimum – 0.94m (Bh.no.MKDR-15) Maximum – 66.74m (Bh.no.MKDR-13)
10	Overburden	Ferruginous Clay / Ferruginous shale
11	Logging and Sampling	1278.30m and 1191 nos.
12	Samples analyzed for radicals	Fe (%), SiO_2 (%), Al_2O_3 (%) by XRF at JNRDC Lab, Nagpur.
13	Average core recovery	85-90%
14	No. of Geological cross-sections	14Nos. along N60°E-S60°W; i.e. S1-S1' to S14 –S14'
15	Specifications (Based on Fe %)	>45% Threshold value; Zones have also been classified at 45% and 55%.
16	Structure	The lease area falls on Ramgad Range which is oriented in NW - SE direction, with steep easterly dip of 75° to 85°.
17	Nature / Type of Ore	i) Haematitic ore, Shaly ore, Soft Laminated ore, Powdery ore and siliceous ore. ii) Waste type (OB / IB) – Ferruginous clay, Limonitic clay and BHQ.
18	Stratigraphy	Hard and soft Laminated Ore, Ferruginous Clay BHQ / BHJ
19	Ore body dimension	Average Strike length : 794.04m Average wide area : 25-160m Depth of intersection : 797.187m RL (at 45% Fe) (MKDR-5) Mineralized zone : 725.06 m RL Average true thickness : 36.37m; Average Grade : Fe%.50.89 (at 45% Fe)
20	Intercalation	BHQ, altered BHQ, Ferruginous Clay.

<table>
<tr><td>21</td><td>Ore Reserves</td><td>
<table>
<tr><th>Cross Section</th><th>Strike length (m)</th><th>Average thick (m)</th><th>Reserves (in Mt)</th><th>Grade Fe%</th><th>Metal Content (in Mt)</th><th>Remarks (Fe %Cutoff)</th></tr>
<tr><td>S1 to S4,S6 to S8 & S10 to S14</td><td>794.04</td><td>36.37</td><td>9.260</td><td>50.89</td><td>4.712</td><td>45</td></tr>
<tr><td>S1,S3,S7,S8,S10 to S14</td><td>604.22</td><td>29.11</td><td>4.588</td><td>59.34</td><td>2.722</td><td>55</td></tr>
<tr><td>S1 to S14</td><td>951.00</td><td>57.00</td><td>20.400</td><td>41.64</td><td>8.494</td><td>35 (planning cut-off)</td></tr>
</table>
Rice Ratio Fe - SiO_2 + Al_2O_3 ratio is 7.602
Al_2O_3 : SiO_2 ratio is 0.251
Al_2O_3 : Fe ratio is 0.084
</td></tr>
<tr><td>22</td><td>Physical Facts</td><td>Mineralised Area: 0.12 Sq.km.
Non-mineralised Area: 0.18 Sq.km.
Broken Area: 0.12 Sq.km.
Non-broken Area: 0.18 Sq.km.
Lumps - 26.75%
Fines - 73.25%</td></tr>
<tr><td>23</td><td>Recommendations</td><td>M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) has potential that would be amenable to systematic scientific mining. However, it has good ore resource potential, over the entire mine lease area at the planning cut-off of 35% Fe is 20.400 m.t. with an average thickness of 57.00m, av. grade of 41.64% Fe, which would further augment the ore resources.</td></tr>
</table>

GEOLOGICAL REPORT ON
ESTIMATION OF IRON ORE RESERVES IN RESPECT OF
M/s KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No.2563)
RAMGAD RANGE, SANDUR SCHIST BELT
DISTRICT: BALLARI, KARNATAKA

CHAPTER-1

1.0.0 INTRODUCTION

1.1.0 GENERAL

1.1.1 The extensive exploitation of Iron ore by small and large mine lease area holders by violating all norms fixed by the government, besides, the illegal mining beyond their lease boundary by few mine owners had forced the government to stop mining activity and cancelled the mining leases since September 2011 by the verdict of Hon'ble Supreme Court of India in its Order dated: 24.02.2014. Accordingly, a committee was formed to assess the extent of encroachment / violation based on the joint survey conducted by authorities under the Chairmanship of the Chief Secretary to Government of Karnataka. Considering the extent of encroachment, 51 mines have been grouped under C-category mines and the mining licenses of these mines were cancelled. As per the guidelines of Director, Department of Mines and Geology vide letter no. GO No.DMG/MLS/MECL/2013-14, dtd. 28.12.2015 has entrusted to MECL to carry out exploration for the estimation of iron ore reserves/resources for 15 C category mines falling in Sandur taluk of Ballari (10 mines), 2 mines in Chitradurga and 3 mines in Tumkur districts of Karnataka. In the subsequent detailed discussions with official of IBM, DMG and MECL, it was decided to restrict the exploratory drilling at 100m grid interval in the mineralized zone and at 200m grid interval in non-mineralized or non-exploited area or virgin area. The method of drilling involved are both RC and Coring, which worked out to be 20% coring and 80% RC drilling (mutually agreed by the Committee consisting DMG, Karnataka, IBM and MECL Officials).

1.1.2 MECL officials visited 15 abandoned C-Category iron ore mines in Sandur area of Ballari district, Hiriyur area of Chitradurga district, Chikanayakana halli of Tumkur districts along with DMG officials between 11.01.2016 to 13.01.2016 in Ballary mines, on 08.01.2016 in Chitradurga mines and 18.01.2016 in Tumkur mines in prelude to the exploration in the 15-C Category mines 2nd Phase. It is observed that, no systematic mining being done, no old exploration / borehole data or chemical data and no updated Surface Plan is available for planning further exploration in these 15 C Category of mines Phase-2.

1.1.3 Based on the GPS Survey data of CEC, the proposal for detailed exploration for iron ore in 15-C Category mines located in Ramanadurg range, NEB range in Ballari district, 2 mine lease area in Chitradurga district, and 3 mines in Chiknayakana halli area of Tumkur district of Karnataka were prepared.

1.1.4 Sandur Schist Belt, one of the younger schist belts of Dharwar Super Group occupied in about 2500 Sq.km area between Ballari, Hospet and Sandur in the Ballari districts of Karnataka, is known for its rich accumulation of both Iron and Manganese ores. Extensive Iron and Manganese Ore Mining is the main activity in Sandur, Hospet and Ballari areas.

1.1.5 In future, almost entire Europe (excluding former USSR), Japan, Korea, China and other Asian Countries will nearly depend upon import of iron ore. The main exporters will be Brazil, Oceania [Australia, New Zealand etc.) and former USSR. India has a good export market in the eastern sector as Australia seems to be the sole major competitor; besides, India has a good market even in Europe and Africa. Therefore, it is pertinent to explore large areas to cater to the heavy export of iron ore.

1.1.6 The Ramgad, Kumaraswamy, Deodari, Donimalai, Thimmappanagudi, NEB range and Copper mountain Ranges are the most important iron ore mining centers of Ballari - Hospet area.

1.2.0 LOCATION

1.2.1 M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) mine lease area falls on Ramgad Range of Sandur Schist Belt, at a distance of about 20 kms from Sandur, lies between Longitudes 76º25'02.00" and 76º26'06.3" and Latitudes 15º10'07.8" and 15º10'37.3". The block falls in Ramanadurga village of Ramgad Range. The block is covered in Survey of India Toposheet No.57 A/8 (Plate-I).

1.2.2 The Sandur Schist Belt lies between Longitudes 76º22' and 76º52' and Latitudes 14º50' and 15º17'. The area is covered in Survey of India Topo sheet Nos.57 A/7, 8, 11,12,15,16 and 57 B/9.

1.2.3 Ballari, Sandur and Hospet are the important townships of the area. Sandur is the tehsil headquarter, which is located in the south central part of Sandur Schist Belt. Ballari is the district headquarter, which is about 60km from Sandur. Donimalai is the NMDC Township, at a distance of about 15 km from Sandur.

1.2.4 Jindal had established Vijayanagar Steels (JSW) near Toranagallu (R.S.), with the Thimmappangudi block iron ore resources as captive mine.

1.2.5 Pellatisation plant belong to private party exist in Hospet.

1.3.0 ACCESSIBILITY

1.3.1 Sandur is connected by road from Ballari, Hospet, Toranagallu (RS) and Donimalai. Hospet, Toranagallu and Ballari are connected by broad gauge railway line on Hubli - Guntakal section of south central railway. Bengaluru is the State capital and it is at about 340 km from Sandur by road and accessible by train from Hospet and Toranagallu,

1.4.0 PHYSIOGRAPHY

1.4.1 Physiography of the area is characterized by two elongated ridges trending NNW-SSE. The western ridge is named as Ramgad range and the eastern ridge is named as Donimalai range and the E-W trending South East extension of Ramgad range is called Kumaraswamy range. The height of these hill ranges varies between 600 to 1100m from MSL.

1.5.0 CLIMATE

1.5.1 The Sandur Schist Belt area of Ballari district experience dry semi arid climate with annual rainfall varying from 40cm to 80cm. The monsoon begins in June first week and continues up to September and winter from the month of October to January is somewhat pleasant. However, hot to very hot summer prevails normally during the month of February to May.

1.6.0 SCOPE OF WORK

TABLE-1:
QUANTUM OF WORK EXECUTED IN
M/s KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No.2563)

Sl. No	Activity	Quantity
1	Topographical Survey - on 1:1000 scale (Dove tailing of data provided by DMG, Karnataka)	30.09 Ha
2	Geological Mapping	0.3009 sq. km
3	**Survey**	
	i) Triangulation/Traversing	30.09 Hectares
	ii) BH Fixation	19 nos.
	iii) Determination of RL and Co-ordinates	19 nos.
4	**Exploratory Drilling**	
	i) Core Drilling	233.30m (4 Bhs)
	ii) RC Drilling	1045.00m (15 Bhs)
5	**Geological Activities**	
	i) Core Logging	1278.30m (19 BHs)
	ii) Sampling	1191 Nos
	iii) Lump and Fine - Pits	2 Nos
	iv) Bulk Density determinations	2 Nos
6	**Chemical Analysis :**	
	i) Primary (Fe,Sio_2 and Al_2O_3)	1191 Nos.
	ii) Specific Gravity determination	4 Nos.
7	**Physical Analysis**	
	i) Petrographic Studies	2 Nos.
	ii) Mineragraphic Studies	2 Nos.

1.7.0 ACKNOWLEDGEMENTS

1.7.1 MECL is highly thankful to CEC committee headed by Chief Secretary, Government of Karnataka for his valuable suggestions, and guidance in planning and execution of the proposed exploration in 2nd Phase, 15-C Category iron ore mines of Ballari – Hospet area, Karnataka.

1.7.2 MECL places on record its profuse thanks to Director, Directorate of Mines and Geology, Karnataka for assigning the responsibility of exploration in M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563), Ballari district, Karnataka.

1.7.3 MECL also gratefully acknowledges the co-operation in execution of exploration activity at M/s Kanhaiyalal Dudheria Mine Lease Area (ML No. 2563) by the officials of Directorate of Mines and Geology, Ballari and Hospet.

CHAPTER-2

2.0.0 REGIONAL GEOLOGY AND STRUCTURE

2.1.0 BACKGROUND INFORMATION

2.1.1 H. James defined iron formation as a “Chemical sediment, typically thin bedded or laminated, containing 15% or more iron of sedimentary origin and commonly but not necessarily containing layers of Chert”. Banded Iron Formation (BIF) has been formed within a single epoch of earth between 1900 and 2500 million years ago. The amount of iron deposited in this epoch of sedimentation is quite enormous.

2.1.2 The pre-Cambrian banded iron formations which are known as **IRON FORMATIONS** or **IRON ORE SERIES** consists of banded haematite quartzite, banded haematite jasper, banded chert, etc. in the un-metamorphosed state; whereas on metamorphism, the banded ferruginous rocks have given rise to banded magnetite quartzite in which, the magnetite has been derived from the original haematite and in places from grunerite - cummingtonite bearing rocks. The basic eruptive rocks of the Precambrian time are the major source of iron ores. The iron ores have been deposited through sedimentary resources followed by leaching, oxidation by surface water percolation over a long period and re-cementation with some replacement have also played a part at places. The haematite generally occupies the top of the ridges and hillocks, which are of great magnitude. Most of the ores have grade of > 60% and are in association with ores of medium and lower grade in larger quantities. The grain size varies from fine to coarse. Few grains of martite and magnetite are present, which are of not much significance. Due to weathering haematite have altered to limonite and goethite and finally to laterite at places.

GEOLOGICAL DISTRIBUTION OF INDIAN IRON ORE DEPOSITS

Formation	Type of Deposits	Areas of occurrence
Quarternary	Laterite	Small occurrences widely scattered as derived from many formations including Deccan Traps.
Tertiary Eocene and Miocene	Ironstones	NE Regions [Assam] Kumaon Hills, Travancore, Malabar coast.
Jurassic Rajmahal Trap (inter trappean beds)	Ironstones	Birbhum, West Bengal. Rajmahal Hills, Bihar

Formation	Type of Deposits	Areas of occurrence
Triassic Sirban limestone	Haematite and limonite	Udhampur, Kashmir
Gondwana Ironstone	Ironstone and Siderite	Raniganj Coalfield
Barakar Mahadeva	Ironstone and Siderite	Birbhum, Auranga Coalfield
Cuddapah Bijawar, Gwalior, Cuddapah	Haematite and Ferruginous, Quartzite	Bijawar, Gwalior, Indore, Rewa, Mahendragarh, Jaipur, Jhunjhunu, Sikar, Cuddapah
Banded Iron Formation (Metamophosed)	Magnetite-Quartzite	Guntur, Salem, Tiruchira-pally, Shimoga, Chikmaglur Mandi (Himachal)
Banded Iron Formation	Haematite (massive, shaly, powdery etc).	Singhbhum, Bonai, Keonjhar, Mayurbhanj, Poonch (Kashmir), Bastar, Durg, Jabalpur, Chandrapur, Gadchroli, Ratnagiri, Dharwar, Ballari, Shimoga, Chikmaglur, Goa.
Granites	Magnetites (Residual)	Jaintia Hills (Assam)
Granodiorites (Rampahari Granite)	Apatite-Magnetite rock	Singhbhum, Mayurbhanj
Basic Ultra basic rocks	Titaniferous-vanadiferous magnetites	Singhbhum, Mayurbhanj
Pre-Cambrians	Magnetite	SE Karnataka, Mysore

2.1.3 The BIF has great economic potential, as it depository to many useful metalliferrous ores such as iron, aluminum, copper, chromium, gold, uranium, etc.

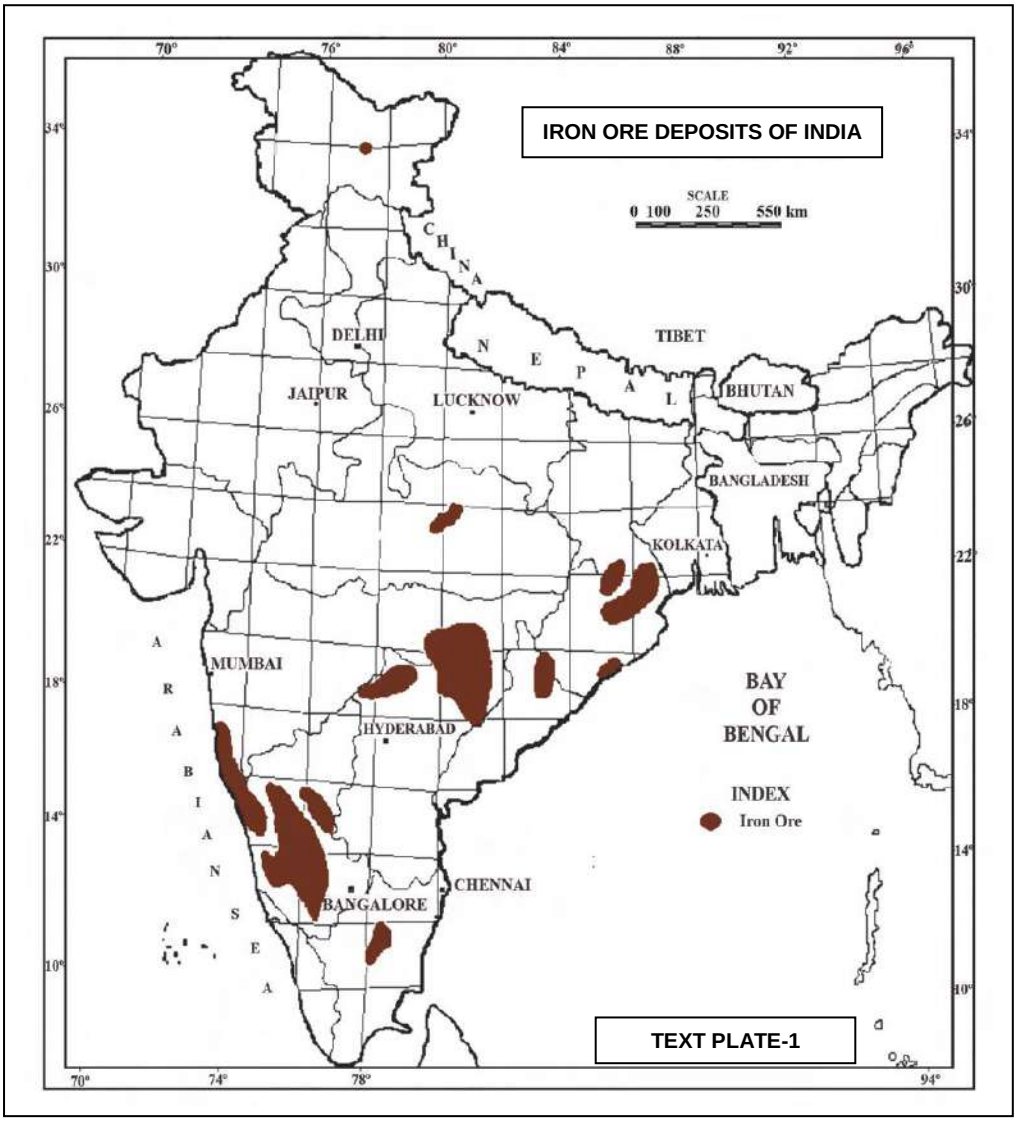
2.2.0 CLASSIFICATION OF IRON ORE DEPOSITS

2.2.1 The iron ore resources of India are mainly distributed within the five major zones as detailed below:

GEOGRAPHICAL DISTRIBUTION [GSI's Bulletin series A, No.51 (1988)]
(Text Plate-1)

ZONE	
A	Chiria, Noamundi, Kiriburu, Meghahatuburu, Thakurani, Bolani, Gua, Malong toli, Gandhamardan, Daitari.
B	Bailadila, Dalli, Rajhara, Rowghat, Mahamaya, Aridongri, Surajgarh.
C	Donimalai, Ramgad, Kumaraswamy, NEB Range, Ettinahatti, Tumti, Belagal.
D	N.Goa, S.Goa, Redi.
E	Kudremukh, Bababudan, Kudachadri.

2.2.2 Also less important (deposits) belts are around central Madhya Pradesh, Rajasthan, Haryana, Tamilnadu, Andhra Pradesh etc.,



2.3.0 REGIONAL GEOLOGY

2.3.1 The geological formations of the Ballari, Hospet and Sandur region are known by the name Sandur Schist Belt, belongs to Dharwar Super Group. The generalized succession of these formations was first suggested by Foote (1895) is as follows

2.3.2 STRATIGRAPHIC SUCCESSION OF SANDUR SCHIST BELT

Dharwar Group	Intrusive rocks
	-----Un-conformity----------
	Sedimentaries
	-----Un-conformity----------
	Basic igneous rocks
	-----Un-conformity----------
	Older gneisses granites

2.3.3 **Older gneisses and granites:** These are the oldest rocks of the area and occur mainly along the Western and South western boundaries of the schist belt.

2.3.4 **Basic igneous rocks:** This group comprises mainly of meta basalt and epidiorites and overlies the gneisses and granites with an unconformity.

2.3.5 **Sedimentaries:** The sedimentary formations consist largely of arenaceous sediment (sandstones and quartzites) successively followed by argillaceous (shales, phyllites and slates) and ferruginous sediments (ferruginous shales, quartzites, manganese and iron ores).

2.3.6 **Intrusive rocks:** These include both acid and basic intrusives. The acid intrusives are in the form of granites while the basic ones are in the form of dioritic or doleritic sills.

2.3.7 The two most significant economic mineral deposits of the area are manganese and Iron ores. The manganese ore is confined mainly to the southern portion of Kumaraswamy range and the western flanks of the Ramgad range. Iron ore occurrences are spread over almost all the major hill ranges viz., Ramgad, Kumaraswamy, Donimalai, Devadarigudda, Thimmappanagudi, NEB range and Copper Mountain (Belagal) range.

2.4.0 STRUCTURE

2.4.1 The hill ranges of Sandur Schist Belt appear to be isoclinal synclines trending NNW – SSE with general northeasterly dip. The major valleys are in the anticlinal regions. The Copper Mountain (Belagal), Thimmappanagudi, Ramgad, Kumaraswamy and Donimalai ranges are located in the synclinal

regions. The overall structure of the schist belt is synclinal and it is often called "Sandur Synclinorium"

2.4.2 The eastern and western limbs of Sandur Syncline and Copper Mountain cross folded syncline show only iron ore enrichment. The en-echelon drag fold shows concentration of manganese ore along the troughs and the saddles (Plate-II).

2.5.0 GEOLOGY OF THE AREA

2.5.1 The Sandur Schist Belt is known for its economics deposits of iron and manganese and studied in details by many prominent workers like New Bold (1838), Foote (1895), Roy and Biswas (1983), Martin and Mukhopadhyay (1987 and 1993), Naqvi et.al. (1987), on various aspects like depositional environment, structure and depositional process etc. Geo-chemical data study by Manikyamba et. al. (1993) inferred that the iron formation were the result of submarine hydrothermal venting at the mid-oceanic ridge, ferruginous volcanic sedimentation and biogenic activity.

2.5.2 The lithostratigraphy of the volcanic and sedimentary rocks under the new term are defined as "Sandur Group" which are as follows:

Sandur Group	Vibhutigudda Formation
	Taluru Formation
	Donimalai Formation
	Ramanmala Formation
	Deogiri Formation
	Yeshwanth nagar Formation
----------Tectonic contact ----------	
Basement not known (probably gneiss)	

2.5.3 **Yeshwantnagar Formation:** This formation is dominated by metamorphosed ultramafic rocks, metagabbro and amphibolites on the south western margin of the schist belt.

2.5.4 **Deogiri Formation:** The sedimentary sequence overlies the amphibolites of the Yeshwanth nagar formation. The lowest part of the formation are mostly greywacke and the top most part are manganiferous greywacks which immediately underlie the lowest banded chert of Ramanmala Formation. The greywacks are commonly calcareous. Much of the manganiferous greywacks occurs as secondary concentrations of oxides or hydroxides in the form of nodules or encrustations on fractures.

2.5.5 **Ramanmala Formation:** The lower part of the Ramanmala formation is dominated by banded ferruginous cherts and interbedded amphibolites. The chert layers increase in number along the strike of the formation from north-

west to south-east. Many of these chert layers are banded iron formations which are host to economic deposits of secondary haematite and lies on top of the Ramanmala and Deogiri hill ranges.

2.5.6 **Donimalai Formation:** This formation comprises amphibolites and banded ferruginous cherts with subordinate polymict conglomerate and greywacks. Numerous banded units of chert, the characteristic of the Donimalai Formation. They vary in thickness from 10 to 100m. The banded haematite enriched types of rocks have magnetite, Jasper and pyrite rich cherts to non-ferruginous grey cherts mostly.

2.5.7 **Taluru Formation:** The formation mostly comprises of schistose amphibolites and pillow structured meta-basalts, which are host to thin, but persistent intercalations of banded cherts and local pods of coarse grained grey carbonates. The lower part of the formation comprises inter bedded banded ferruginous cherts, schistose chlorite carbonate rich amphibolites and siliceous schist.

2.5.8 **Vibhutigudda Formation:** The hill range of northeast of Donimalai range includes formations comprising sedimentary and volcanic rocks such as greywacks and banded ferruginous chert that immediately overlies the amphibolites of the Taluru formations.

2.6.0 STRUCTURAL CONTROL

2.6.1 Iron ore, banded ferruginous cherty quartzite, are intimately associated with gabbro of pre-tectonic and post tectonic origin.

2.6.2 The hill ranges trend in NNW-SSE direction, which are similar to the regional tectonic trend of the Sandur Schist Belt. The area has under gone two phases of deformation [F1 and F2] and metamorphism. The axial trace of F1 have NNW-SSE trend which is refolded by open F2 folds trending ENW-WSE. The primary structure of banded iron ore formation is bedding and pene-contemporaneous faults. Schistosity and fracture cleavage are common. The repetitions of iron ore bands, which cause the thickening of ore at places, are due to diastrophic folds (Plate-II).

2.7.0 GEOLOGY AND STRUCTURE OF THE MINE LEASE AREA

2.7.1 Iron ore band trending NW-SE with steep westerly dip occurs over the entire area of mine lease. The float ore occur between S7 and S10. Clay bands, ferruginous shale and meta-gabbro as intrusive also occur over the lease area.

2.7.2 The sub-surface geology deduced after the exploratory borehole data is given below:

Sandur Group (Ramana Mala Formation)	Soil / float ore
	Gabbro / Amphibolite
	Shale
	Clay / Phyllite
	Ferruginous phyllite / Ferruginous shale
	Blue Dust
	Clayey iron ore
	Shaly ore / Limonitic ore / Ochre
	Soft laminate ore
	Haematitic ore
	Silicious ore (enriched BHQ)
	BHQ

2.7.3 The general trend of the iron ore formation is N20°-40°W – S20°-40°E with steep easterly dip of 60°-80°. BHQ is exposed over the mine lease area of 855.00m strike length in the hanging wall side between S4 to S14 with average thickness ranges between 50m to 40m and follows same trend of iron ore formation. Few intervening clay bands were also noticed (Plate-III).

CHAPTER-3

3.0.0 EXPLORATION BY MECL

3.1.0 OBJECTIVE

3.1.1 The main objective of exploration by MECL is to estimate the iron ore reserves and resources in M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) with the following guidelines as given in the work order dated 28.12.2015.

Borehole fixation, determination of boreholes co-ordinates and RL.

i) The ratio of core drilling to RC drilling is 1:4 (20% Core drilling & 80% RC drilling)
iii) To prepare geological map of the mine lease area besides planning and fixation of exploratory boreholes
iv) To assess the strike and depth continuity of iron ore in the mining lease area
v) Lumps and fines determinations
vi) Broken up area / Non-broken up (Virgin) area
vii) Mineralized / Non-mineralized area
viii) Associated minerals if any with quantification as per threshold values.
ix) In accordance with “Mineral (Evidence of Mineral Contents) Rules 2015”.
x) Estimation of iron ore reserves / resources as per UNFC classification

3.1.2 Based on the work order of DMG, Karnataka, the exploration was commenced on 04.02.2016 and completed on 26.02.2016 involving 233.30m core drilling in 4 boreholes and 1045.00m in 15 boreholes by RC drilling, thus amounts to a total of 1278.30m in 19 boreholes. 1191 nos. primary samples, 2 nos each for petrography, mineragraphy and bulk density determinations respectively have been carried out. The chemical analysis has been completed on 29.03.2016.

3.2.0 SUMMARY OF EXPLORATION WORK DONE

3.2.1 The summary of physical work done by MECL is given in Table 1.1. The detailed account of each activity is presented in the following paras.

3.3.0 SURFACE SURVEY

3.3.1 The survey work has been carried by using Differential Global Positioning System (DGPS) of Tremble make having an accuracy of 0.10m with WGS 1984 datum. In the absence of survey of India reference point, within the vicinity of the area, base stations T1 and T2 are fixed at highest elevation of the area, the details of which are given below:

Bearing between T-1 and T-2 = 142°03’45.99”
Distance between T-1 and T-2 = 497.01223m
Line Accuracy 2 seconds

The boreholes have been fixed and RL determined by triangulation method. The triangulation stations details and co-ordinates and borehole header details have been provided as Annexure-I and II respectively.

3.3.2 The DMG Officials of Hospet had shown the pillar nails existed on the ground which was surveyed by MECL and plotted on the map. The survey work has been continued to prepare the topographical map on 1:1000 (Plate-III) and fixation of boreholes by using the Electronic Total station (Sokkia make). The co-ordinates, both National and UTM, of triangulation stations and boundary pillars and boreholes are provided in Annexure-I and II respectively. The total station data including the buffer / encroachment area is given in Annexure-III.

M/s KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No.2563)

Points No.	Geodetic co-ordinates provided by CEC (Hand held GPS, WGS-84)					
	LATITUDE			LONGITUDE		
	D	M	S	D	M	S
LBC-1	15	10	07.8	76	25	58.5
LBC-1A	15	10	13.1	76	25	53.1
LBC-1B	15	10	21.3	76	25	46.0
LBC-2	15	10	31.0	76	25	36.8
LBC-3	15	10	37.3	76	25	44.8
LBC-3A	15	10	27.7	76	25	54.0
LBC-4	15	10	19.9	76	25	02.0
LBC-5	15	10	14.0	76	26	06.3

3.4.0 GEOLOGICAL MAPPING

3.4.1 The geological mapping was carried out with the help of tape and compass over an area of 0.3009 sq.km on 1:1000 scale as Plate-III. The survey stations fixed on the cross section lines were used as reference points.

3.4.2 During the exploration, the benches dug were also studied carefully to decipher and delineate the nature and behavior of iron ore bands. Other formations as well as surface geological features were also incorporated in the topographical and geological map. The structural features viz. attitude, joints, foliation etc. were also recorded and provided in Plate-III. A few field photographs have been appended [Field Photo-1 to 6].

3.5.0 BULK DENSITY DETERMINATIONS

3.5.1 The in-situ bulk density have been estimated on different ore types by making a pit of 50 x 50 x 50 cm on the clean floor of the ore formations i.e. soft laminated and siliceous ores. The excavated material was weighed and volume measured by filling the pit with a measured quantity of uniform grain sized sand. Thus the formula for bulk density is as follows:

$$D = \frac{M}{V}$$

wherein
M= weight of ore material in kg
V= Volume of ore material represented by known volume of sand
Volume of sand= Mass of sand/Density of sand

$$\text{Hence, B.D.} = \frac{\text{Mass of ore}}{\text{Mass of Sand}} \times \text{Density of sand}$$

A total of 2 bulk density determinations estimated is given below:

Sl.No.	Pit No.	Lithology	Density
1	KLD-1	Soft laminated ore	3.11
2	KLD-2	Soft laminated, siliceous Ore	3.02

3.6.0 LUMPS AND FINES

3.6.1 Iron ore seldom occurs in the purity from and size composition conforms to users specifications, therefore deleterious impurities like SiO_2, Al_2O_3, S and P beyond desired limits render the ores unsuitable for use in various industries. Owing to the nature of its occurrence, the hematitic ores fabrics are such that it consists of varying sizes, which are called lumps.

3.6.2 However, when the ore is mined, the lumps of various sizes get produced with bigger particles of more than a meter across and the smallest one being of a millimeter.

3.6.3 Blast furnace process requires lumps between 7mm and 25mm. Therefore, the ore must be crushed to produce the maximum particle size. The crushed ore is divided into various fractions by passing it through sieves. Thus lumps of desired sizes are separated from the fines and the lumpy ore of appropriate quality ore could be charged into the blast furnace directly without further processing.

3.6.4 Through mechanical operations ore are crushed and screened for various fractions; thus lumps and very fine, called “super fines”, which become physically unsuitable for the blast furnace as they are much finer than the ore fines.

3.6.5 The super fines / blue dust, after agglomeration, the ore get subjected to sintering or pelletization.

3.6.6 In order to ascertain the lumps and fine proposition of the ore, pits of 0.50m x 0.50m x 0.50m dimensions have been sunk in the already exploited mines at various locations, which will be of utmost usefulness for determining the ratio between lumps and fines. The particles of the ore measuring +10mm size, <10mm size have been classified as lumps fines respectively. The ratios obtained are given below in respect of M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563).

Pit No.	**Northing**	**Easting**	**Distribution (%)**		**Lithology**
			Lumps (+10mm)	**Fines (<10mm)**	
1	1677666.951	653865.756	22.66	77.34	Soft laminated ore
2	1677794.596	653857.958	26.75	73.25	Soft laminated siliceous ore

3.6.7 The lumps and fines determined for the mine is 26.75 and 73.25 respectively.

3.7.0 BROKEN UP AREA

3.7.1 The total broken up area falling within mine lease area is 0.12 Sq.km.

3.7.2 The adjacent area to the mineralized and potential area with the existing boundaries of the lease hold is 8.10 ha as per Joint inspection report after the field visit between 11.01.2016 to 13.01.2016.

3.7.3 The Associated Mining Company lease area ML No.2434 with an area of 10.14ha is adjacent to M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) towards east. Hence, for the scientific mining and subsequent exploitation of the ore, the mine may be auctioned together.

3.8.0 MINERALISED / NON-MINERALISED AREA

3.8.1 Out of the total mining lease area of 0.3009 sq.km, the mineralized / non-mineralised area is 0.12 sq.km and 0.18 sq.km respectively.

3.9.0 EXPLORATORY DRILLING

3.9.1 The boreholes have been released as per the proposal approved by DMG, Karnataka. The boreholes have been drilled by MECL and closed in consultation with DMG officials at Ballari. In order to assess the total potential of iron ore in the mine area, a total of 19 no. of boreholes for core drilling and 233.30m 4 no. of boreholes for RC drilling have been planned involving of 1045.00m and 15 no. of boreholes respectively. Thus, a total of 1278.30m exploratory drilling (19 boreholes) has been completed in M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) mine lease area. During the period of execution, due to the finer nature of ore, utmost care has been taken while drilling, so as to achieve the maximum core recovery. In the mineralized zone, the overall recovery has been 85-90% and above.

3.10.0 CORE LOGGING

3.10.1 The core and powdery materials recovered from the drilling were logged systematically to demarcate various litho-units. The logging of run wise cores and the powdery materials as well as the cuttings from boreholes have helped in discerning the physical characters like colour, shape, size and nature of mineralisation viz. laminated, goethite, clayey, and siliceous etc. Besides these, the qualitative analytical data were helped in delineating the ore types and non ore. Among the non ore, ferruginous shale/clay, banded haematite quartzite has also been demarcated. The upper portion of ore body has been covered, invariably, by laterite / lateritic ore. However, impersistent remnant banded haematite quartzite have been observed at few places. Based on these observations, ore zones and non-ore horizon were distinguished and delineated. The chemical analyses along with lithological details are given in Annexure IIIA and IIIB. In order to prepare graphic lithologs, concise lithologs were generated and presented in Plate-IV.

Field Photo 1: Bench showing soft laminated siliceous ore

Field Photo 2: Bench showing limonitic clay with limonitic ore near NW boundary of the lease area

Field Photo 3: Pit view from centre of the lease area facing SE

Field Photo 4: Pit view from centre of the lease area

Field Photo 5: Pit view from centre of the lease area

Field Photo 6: Overall pit view from centre of the lease area facing SE

3.11.0 PRIMARY SAMPLING

3.11.1 The borehole cores recovered by drilling were divided into two longitudinal equal halves. One half was taken for sampling, whereas the second half was kept for future reference [with DMG, Karnataka]. The first half was subjected to uniform size reduction of 1mm size. It is thoroughly mixed, pounded and powdered to (-) 100 mesh size by pestle and mortar and then coned and quartered. Three sample packets of 100 gram each have been prepared; out of the three, one packet was handed over to DMG, Karnataka and the other one has been labeled and sent to MECL laboratory for Fe, SiO_2 and Al_2O_3 analyses, whereas the third packet has been preserved for future reference. Generally, one meter length of the core has been considered as a sampling unit, provided no change in lithology or else, the length corresponds to particular lithology has been taken into consideration for sampling purposes. The analytical details of the samples are given in annexure IIIA and V.

3.11.2 The entire lot of chips and powder material were collected from boreholes drilled by Reverse Circulation drill. 50% mostly of chip samples have been thoroughly mixed to have the desired quantity of 500-600 gms. and pounded to (-) 100 mesh size by progressive reduction, three sample packets of 200 gram each has been prepared; out of the three, one has been labeled and sent to MECL Lab., for Fe, SiO_2 and Al_2O_3 analyses, the other packet was handed over to DMG, Karnataka, and the 3rd packet of the sample has been preserved for further studies at camp. The other half core of the boreholes from the mineralized zones has been handed over to DMG, Karnataka in steel core boxes.

3.11.3 Chemical Analysis: All the primary samples were analyzed for Fe, SiO_2, and Al2O3 at MECL laboratory by XRF method. The details of analysis are provided in Annexure-IIIB.

3.12.0 SPECIFIC GRAVITY DETERMINATION

3.12.1 The specific gravity of different types of ores has been determined on samples by Walker's Steelyard Balance method in the MECL laboratory. The results are given below:

Sl. No.	Sample No.	Lithology	Specific Gravity
1	KLDC-1	Soft laminated ore	3.40
2	KLDC-2	Soft laminated siliceous ore	3.13
3	KLDC-3	Hard massive clay	1.52
4	KLDC-4	BHQ	3.01

3.12.2 However, bulk densities determined by different deposits by various agencies are also given below:

Determination of Bulk density by GSI in NEB Range

Ore Zone	Hard Ore	Soft Ore	Powdery Ore
I	3.4	3.0	-
II	-	-	3.0
III	-	-	3.0
IV	4.9	3.0	3.0
V	4.7	3.3	3.0
V-A	4.4	3.0	3.0
X	4.35	3.07	3.0
Mean	4.35	3.07	3.0

Determination of Specific Gravity by IBM in Ballari – Hospet deposit.

Lumpy ore	3.5
Blue Dust	3.8
Mean	3.65

3.13.0 COMPARATIVE STUDY OF BULK DENSITY

3.13.1 A total of 2 pits have been made for determination of bulk density whereas 4 samples have been subjected for specific gravity determination by Walker's Steel Yard Balance at Lab. and the details are given below:

Sl. No.	Lithology	Bulk Density	Specific Gravity
1	Soft laminated ore	3.11	3.40
2	Soft laminated siliceous ore	3.02	3.13

3.13.2 Owing to paucity and limitations of approachability only few pits has been made, whereas, on the typical hard, massive ore none of the pits could be made. Hence, a realistic bulk density of 3.50 has been considered for ore reserves / resources estimation.

3.14.0 PETROGRAPHIC STUDIES

3.14.1 Samples admeasuring 10 cm into 5 cm have been subjected for petrographic studies by thin section which reveals the nature of host rock of mineralization, structural relationship, mineral alterations and genesis of iron ore formations. Two samples have been studied. The rocks shows at times banded and folded nature mostly quartz and ferruginous material is present with occasional sericite, chlorite and Biotite. The details are given in Annexure-VIA.

3.15.0 MINERAGRAPHIC STUDIES

3.15.1 Samples admeasuring 5 cm x 5 cm have been subjected for mineragraphic studies by polished section which reveals grain size, ore minerals assemblages, replacement and byproduct if any. Two samples have been studied. The minerals specimen studies have revealed that mostly hematite, magnetite, goethite is present. It occurs as anhedral to sub-hedral grains. The limonite also occurs. The details are given in Annexure-VIB.

CHAPER-4

4.0.0 MINERALISATION AND CHARACTERISTICS OF IRON ORE

4.1.0 MINERALISATION

4.1.1 The samples with more than 45% Fe and above have been considered as the iron ore whereas samples with more than 35% Fe up to 45% Fe has been considered as mineralized zone. The ore exhibits wide variations in physical properties ranging from compact, hard and massive ore to soft, granular, laminated, unconsolidated sandy blue dust. However, the blue dust is occur rarely in M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563). The reddish brown powdery ore also occur rarely in this mine area.

4.1.2 However, categorization/classification of the ore based on quantitative data such as hard, soft, laminated, powdery etc., have been possible based on mine data (size range or granulometry). It is also based on physical properties like colour, presence or absence of weakness, cohesiveness of the grains etc. This lithological classification helped in revealing a stratigraphical picture of the relative preponderance of different ore types.

4.1.3 The iron ore in nature is not homogeneous, but consists of a mixture of many ore types. Hence, practical approach of demarcating the ore zones based on predominant nature of the lithology/ore substantiated with analytical data have been applied.

4.2.0 TYPES OF ORES

4.2.1 Various types of iron ores are derived from haematite viz. massive ore, laminated ore and blue dust.

Type of Ore	Characteristic Features
Lateritic	Porous and cavernous in nature
Laminated	Closely spaced laminae, which give rise to biscuity ores.
Blue dust (-)10 mesh	Ore constituting of haematite and martite
Massive (Hematitic)	No planar structure

4.2.2 The blue dust normally consists grain size of 10-15% of (-) 100 mesh size fractions and above 80% of (-) 100 to (-) 325 mesh size (MKDR-10).

4.2.3 Besides, the float ore gets accumulated along the slope and foot hills which are, normally of more pure in iron content. In Ballari-Hospet region also the float ore occurs and the iron content is 65-70% Fe. The gangue materials are of shale pieces, banded haematite quartzite, dolerite and clay. If lateritisation is extensive, the alumina to silica ratio will be high.

Type of Ore	Fe%
Massive ore (Hematitic)	67.69
Compact laminated ore	67
Powdery ore	65
Laminated ore	65

4.3.0 GRADE CLASSIFICATION

4.3.1 The exploration efforts in 70's were mainly for lumpy ores, while, the fines were not given economic importance. Similarly, exploration will also be required to categorize the ore reserves / resources based on end user's grade classifications. At threshold cutoff of 45% Fe as stipulated by IBM and at 35% Fe cut-off, the mineralized zones within the lease hold area (main and western bands) have been delineated and presented in the Table-2 and Table-3 respectively.

Table-2
DETAILS OF IRON ORE ZONE INTERSECTED IN THE BOREHOLES
(AT 45% Fe CUT-OFF)

BH No.	Depth (m)		True Thick.(m)	Fe%	SiO_2 %	Al_2O_3 %
	From	To				
MKDR-1	0.00	18.00	16.92	59.01	12.36	2.25
MKDR-2	0.00	26.00	24.44	50.80	21.23	4.89
MKD-3	0.00	11.90	11.19	45.27	16.53	12.51
MKDR-4	0.00	3.00	2.82	46.40	27.27	2.85
	19.00	25.00	5.64	45.59	29.33	2.81
MKDR-5	0.00	3.00	2.82	65.44	3.65	2.60
	64.00	66.00	1.88	47.53	28.27	1.49
	86.00	90.00	3.76	45.40	24.74	7.75
MKDR-7	3.00	31.00	26.32	48.44	22.19	5.90
MKDR-8	0.00	41.00	38.54	50.79	15.38	8.45
MKDR-9	2.00	10.00	7.52	46.04	28.94	1.32
MKDR-10	0.00	54.00	50.76	57.21	12.46	4.02
MKDR-13	1.00	72.00	66.74	46.78	21.32	7.14
MKD-17	0.00	17.50	16.45	48.39	26.68	2.17
MKD-18	0.00	9.45	8.88	60.07	15.44	0.77
	39.50	41.10	1.50	48.12	29.99	0.88
MKD-19	0.00	31.25	29.37	48.62	13.36	2.02

Table-3:
DETAILS OF IRON ORE ZONE INTERSECTED IN THE BOREHOLES
(at 55% Fe CUT-OFF)

BH. No.	Depth(m)		True Thick. (m)	Fe (%)	Sio_2 (%)	Al_2O_3 (%)
	From	To				
MKDR-1	0.00	15.00	14.10	62.30	7.39	2.41
MKDR-1	70.00	71.00	0.94	62.99	6.67	3.12
MKDR-2	0.00	10.00	9.40	60.59	7.98	4.67
MKD-3	0.00	0.85	0.80	59.21	7.84	6.53
	8.90	11.90	2.82	59.08	7.97	7.12
MKDR-5	0.00	3.00	2.82	65.44	3.65	2.60
MKDR-7	15.00	23.00	7.52	56.38	10.52	8.20
	25.00	27.00	1.88	58.47	9.13	7.21
MKDR-8	1.00	2.00	0.94	57.83	8.38	7.95
	8.00	31.00	21.62	58.03	8.22	6.27
MKDR-10	0.00	51.00	47.94	57.73	11.73	4.19
	89.00	90.00	0.94	55.40	6.87	9.65
MKDR-13	2.00	47.00	42.30	57.60	7.29	6.64
MKD-17	0.00	4.50	4.24	59.56	9.65	2.73
	8.99	9.76	0.72	59.12	9.29	2.31
	30.00	30.30	0.28	61.50	6.07	1.71
MKD-18	0.00	6.40	6.03	62.67	7.09	0.83
	31.40	32.15	0.71	62.21	6.01	1.13
MKD-19	0.00	17.20	16.17	61.55	7.86	2.64

4.4.0 DEPTH PERSISTANCE

4.4.1 The general mode of occurrence of haematite deposits, which form bulk of the ore resources in the country, is in the form of surface enrichment. But there are areas like NEB range in Ballari-Hospet, Bailadila Range, Goa, etc., where the ore is in the form of pure sedimentary beds with steep dips as 'reefs'. The average depth range of the mineralised zone proved by the present exploration in the present mine lease area is 36.37.m only. However, at 35% Fe Cut-off the mineralized zone (Table- 4) persists up to 725.306 m RL., and even beyond the explored depth as could be viewed from the geological cross sections S1-S1' to S14-S14'.

Table-4:
DETAILS OF MINERALISED ZONE INTERSECTED IN THE BOREHOLES
(at 35% Fe CUT-OFF)

BH. No.	Depth(m)		True Thick. (m)	Fe (%)	Sio_2 (%)	Al_2O_3 (%)
	From	To				
MKDR-1	0.00	79.00	74.26	40.92	35.92	3.05
MKDR-2	0.00	90.00	84.60	40.63	35.29	3.39
MKD-3	0.00	25.14	23.65	39.52	32.82	6.83
MKD-3	55.85	75.50	18.47	36.11	46.54	1.27
MKDR-4	0.00	49.00	46.06	40.63	35.62	1.47
MKDR-5	0.00	92.00	86.48	38.06	40.88	1.93
MKDR-6	0.00	31.00	29.14	37.35	23.05	16.95
MKDR-7	0.00	49.00	46.06	42.15	31.49	4.95
MKDR-8	0.00	85.00	79.90	43.11	27.63	6.08
MKDR-9	0.00	14.00	13.16	43.20	32.72	1.15
MKDR-9	38.00	39.00	0.94	35.17	47.61	1.81
MKDR-9	40.00	43.00	2.82	35.80	45.36	1.61
MKDR-9	45.00	46.00	0.94	35.09	48.69	0.69
MKDR-9	49.00	50.00	0.94	36.79	43.79	3.25
MKDR-9	51.00	52.00	0.94	38.10	37.24	3.18
MKDR-9	65.00	66.00	0.94	36.83	42.20	2.90
MKDR-9	71.00	80.00	8.46	35.19	47.60	1.37
MKDR-10	0.00	60.00	56.40	55.45	14.57	3.70
MKDR-10	60.00	115.00	51.70	35.89	45.93	1.13
MKDR-13	1.00	75.00	69.56	46.24	22.08	7.18
MKDR-15	0.00	104.00	97.76	37.38	42.39	2.78
MKD-17	0.00	46.60	43.78	39.61	38.44	2.84
MKD-18	0.00	53.00	49.85	39.65	41.18	0.94
MKD-19	0.00	58.20	54.73	47.46	28.49	1.92

4.5.0 MINERALISATION FACTOR

4.5.1 Mineralogy of an iron deposit has a great influence in the ore treatment characteristics and economics. Magnetite is recoverable by relatively simple, economical magnetic separation while, haematite, goethite, siderite require expensive roasting or flotation processes. Although when the grains are coarse, haematite ore may get treated with low cost. Mineralisation factor is the ratio of net ore bearing area to gross area. It is referred as the co-efficient of impurities. Out of the mining lease area of 0.3009 sq. km., the mineralized area is 0.12 sq. km. Hence, the mineralization factor for M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) is 0.4.

4.6.0 PHYSICAL CHARACTERISTICS OF ORE

4.6.1 The types of ore present in this block are lateritic ore, massive $\pm$ laminated, soft laminated, blue dust, Limonitic ore, powdery and siliceous ore.

4.6.2 Principal ore minerals are haematite + magnetite, goethite and limonite. The iron content ranges from 62.7% to 65.5% in blue dust. However, in the mine lease area of M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) the blue dust occurs rarely and soft laminated ore has been encountered mostly.

4.6.3 The physical characteristics of the hematite ore is its natural size as lumps and fines, further crust ore for feeding into the blast furnace also creates fines and super fines.

4.7.0 CHEMICAL CHARACTERISTICS OF ORE

4.7.1 In the entire deposit, the high grade ore is almost free from lateritisation and the laterite area is very less (2-3%). The haematitic ore persists even beyond the level of exploration as could be visualize from the geological cross sections.

4.7.2 Silica to Alumina ratio ranges between 0.182 to 0.756 with the average of 0.251 indicating low level of lateritisation. The ore are in general, rich in iron (>45%Fe), but they also contain 1-7% Al_2O_3 and the ore deposits normally have Al_2O_3: Fe ratio around 0.084.

4.7.3 The rice ratio for the mine lease area is 7.602.

CHAPTER-5

5.0.0 METHOD OF RESOURCE ESTIMATION

5.1.0 RESOURCE ESTIMATION BY GEOLOGICAL CROSS-SECTION

5.1.1 Resources have been estimated by geological cross section method. In order to delineate the ore and non-ore, the grade or threshold value of 45% Fe has been adopted, thus non ore above and below ore zones has been demarcated. The rule of gradual change or law of linear function has been applied [Constantine C. Popoff, 1965] along with the rule of nearest points for application of influence of half way between successive boreholes.

5.1.2 At threshold cutoff of 45% Fe as stipulated by IBM, the mineralized zone within the lease hold area, the ore reserves are estimated.

5.1.3 A total of 14 cross sections serially numbered S1-S1' to S14-S14' have been prepared on 1:1000 (Plate-V) from east to west along N60°E-S60°W, on the interpretation of sub surface borehole qualitative data along with surface geological data, which is perpendicular to general strike of the ore body, the cross section were prepared. A typical geological cross section S8-S8' is given as Text Plate-2.

5.1.4 Dip continuity up to 50.0 m on either side of the iron ore intersection of the borehole has been placed under (G1); beyond 50 meters up to 100m has been placed under G2 and rest, if any, is placed under (G3) Category of UNFC. Wherever influence of boreholes has been taken into adjacent section the reserves has been placed under next category i.e. G2 where it was G1 initially in principle sections.

5.1.5 Correction factor of 1.064 for Thickness of Iron ore in strike direction has been applied. Similarly a correction factor of 0.94 has been applied to get true thickness.

5.1.6 A call factor of 10% reduction had been applied to arrive at the net geological reserves.

5.2.0 GRADE CLASSIFICATION

5.2.1 The mineralized zone containing >45% Fe has been demarcated as ore zone. Further, zones containing >55% Fe have also been demarcated in the cross sections.

5.2.2 Lithounits such as ferruginous shale, siliceous iron ore (enriched BHQ) with 45% Fe mostly, or at places when it falls within rich zone, owing to thin parting nature of non ore, have also been included in the ore zone.

5.2.3 The grade wise zones demarcated are given below:

Cut-off	Strike length (m)	Sections	Av. True thick. (m)	Average Grade Fe%
45	794.04	S1-S14	36.37	50.95
55	670.27	S1,S3,S4,S7,S8 and S10 to S14	29.11	59.34

5.3.0 SHAPE OF THE ORE BODY

5.3.1 The shape of the ore body on the cross section line has been obtained by interpretation and correlation of the borehole data. Each borehole gives a point for the location in space of the ore bottom, which in general is BHQ.

5.3.2 The possibility of the ore body being in the nature of folded sedimentary bed, behaving as a stratigraphic unit was considered. The alternative hypothesis of the ore body, being a leached and replaced portion of some pre-existing rock, in this case the BHQ, appeared to be more realistic and adopted for determination of the ore bottom configuration. The ore bottom was delineated by joining intersection on adjacent boreholes through smooth lines, though these lines may cut across the general dip of the formation.

5.3.3 The shape of the non ore consisting mostly of BHQ has been ascertained by joining the upper limit of the ore zone [>45% Fe] in adjacent boreholes. However, in certain cases the thickness of non ore zone [< 45% Fe] is substantially higher side hence at planning cutoff of 35% Fe, the mineralized zone has been demarcated and the zone details are presented in the Table-5.

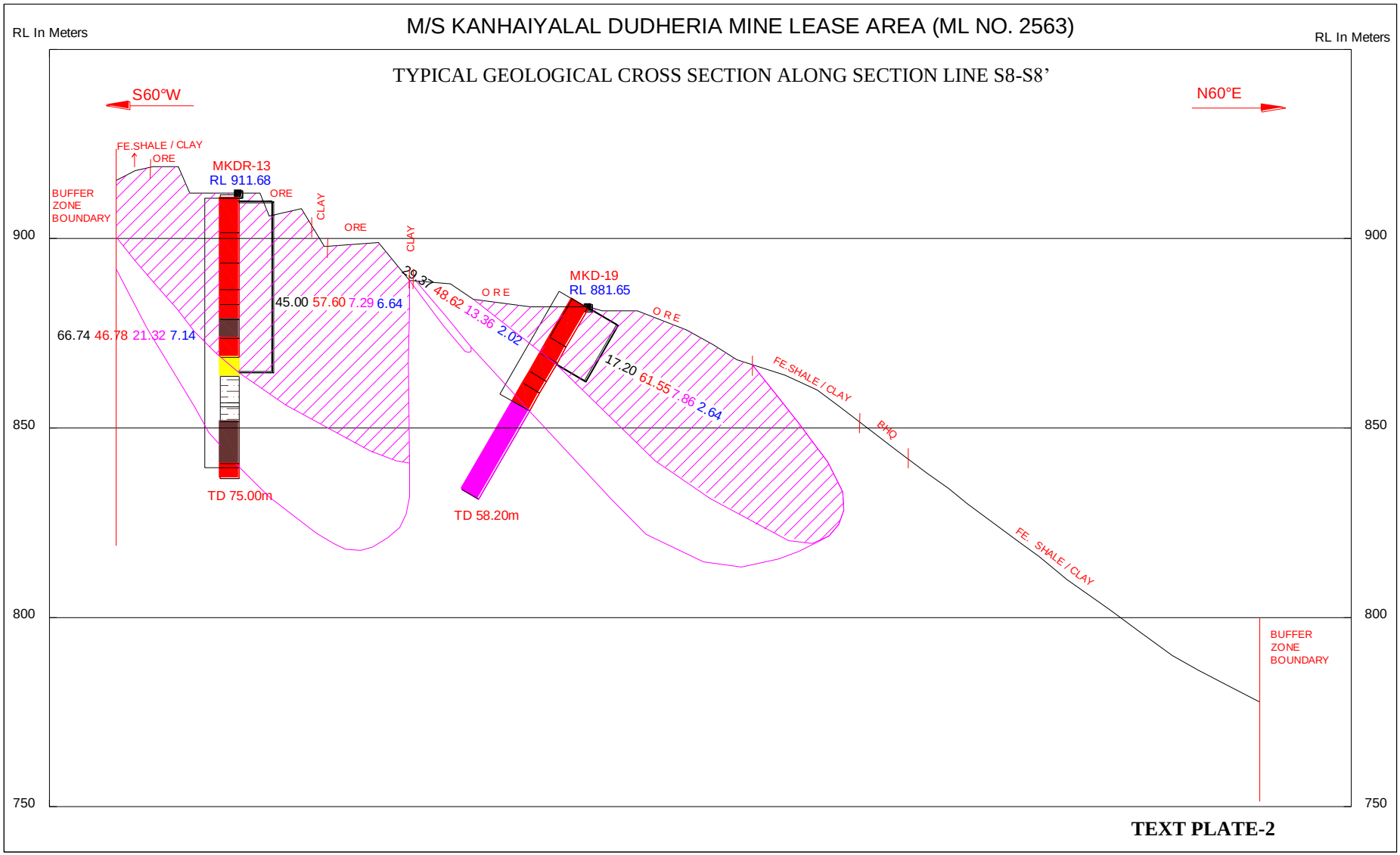
5.3.4 The intercalation of ferruginous clay/shale and remnant BHQ in the ore body has been consistently of higher side.

5.3.5 Influence of each cross section has been taken up to half the distance following “rule of gradual change” and “rule of nearest point”. However at the extreme end of the area of exploration (S1-S1’ and S14-S14’) sectional influence up to buffer zone of mine lease area (7.5m from mine lease boundary) has been considered.

5.4.0 GEOMETRY OF THE ORE BODY

5.4.1 Over the entire mining lease area, from east to west, the iron ore zones occur as single ore band and its geometry is as follows:

Cross Section	Strike length (m)	Average thick (m)	Reserves (in Mt)	Grade	Metal Content (in Mt)	Remarks (Fe Cutoff)
S1-S4, S6-S8, S10-S14	794.04	36.37	9.260	50.89	4.712	45%
S1,S3,S7,S8, S10 to S14	604.22	29.11	4.588	59.34	2.722	55%
S1-S14	951.00	57.00	20.400	41.64	8.494	35%


M/S KANHAIYALAL DUDHERIA MINE LEASE AREA (ML NO. 2563)
TYPICAL GEOLOGICAL CROSS SECTION ALONG SECTION LINE S8-S8'
RL In Meters
RL In Meters
S60°W
N60°E
FE.SHALE / CLAY
ORE
MKDR-13
RL 911.68
BUFFER ZONE BOUNDARY
ORE
CLAY
ORE
CLAY
ORE
MKD-19
RL 881.65
ORE
FE.SHALE / CLAY
RHQ
FE. SHALE / CLAY
BUFFER ZONE BOUNDARY
66.74 46.78 21.32 7.14
45.00 57.60 7.29 6.64
29.37 48.62 13.36 2.02
17.20 61.55 7.86 2.64
TD 75.00m
TD 58.20m
900
850
800
750
TEXT PLATE-2

5.4.2 Based on the geological prudence, the above mentioned behavior of the ore zone has been deciphered and delineated.

5.4.3 An intrusion of ferruginous clay occurs intermittently over the entire lease area. The iron formation trends NNW-SSE with steep easterly dip 60º-80º. A remnant BHQ formation also occurs over the strike length of 951m. It ranges between 5m to 60m wide and runs parallel to iron ore bands.

5.5.0 ESTIMATION OF RESERVES / RESOURCES AND GRADE

5.5.1 After delineating the limit of the ore zones at >45% and boundaries of different litho-units, geometry of the ore body have been deciphered and demarcated. Any zone with value 45%-55% Fe and >55% Fe have also been delineated. The same has been plotted on to the respective cross sections. The sectional area of the ore zone has been computed by the software using AutoCAD map.

5.5.2 Ore resource tonnage has been estimated by multiplying the volume with the tonnage factor of specific gravity of 3.50. The sum has been considered as geological in-situ resources.

5.5.3 At the back drop of iron ore extraction from the lease hold area along the entire strike length of 951.00m over an average wide area of 65.00m – 155.00m has been extensively mined out up to the quite appreciable vertical depth, which allows us to presume that the iron ore zone has wide persistence and continuity. Moreover, iron ore has been extracted from Kumaraswamy range not only by NMDC but also by SMIORE since Independence. However, Dalmia International has been extracting the ore from NEB range since Independence only for exploitation. Therefore, UNFC code pertains to geological axis of (G1) and (G2) have been assigned. The first 25m on either side of the intersection has been placed at G1, the next 50m at G2 and the rest has been placed at G3. Thus estimated ore reserves at 45% Fe cut off is given in Table-5.

5.5.4 A total of 9.26 m.t. of net reserves with average grade of 50.95% Fe, 18.42% SiO_2 and 4.69% Al_2O_3 has been estimated.

5.5.5 At 55% Fe cut-off the net insitu reserves estimated is 4.588 million tonnes with average grade of Fe 59.34%, 8.85% SiO_2, 4.36 Al_2O_3 .

5.5.6 After critical study along N30ºW–S30ºE direction and the behavior of ore bands has been studied which shows that the ore body persists even beyond the explored depth of 725.306m RL (MKDR-15).

5.5.7 An attempt has been made to assess the ore resources at a planning cut-off of 35% Fe. The iron mineralisation has been persistent over the entire strike length of 951m along the wide area of 25m - 160m with an average thickness of 57.00m and the ore resources is 20.400 million tonnes with the grade of 41.64% Fe.

Table No.5: SECTION-WISE - BOREHOLE-WISE ORE RESERVES BY CROSS SECTION METHOD (at 45 % Fe cut-off) IN M/s KANHAIYALAL DUDHERIA MINE LEASE AREA ML NO. 2563

Section Number	Borehole Number	Intersection (m)		Diff (m)	True Width (m)	Average Sectional Influence (m)	Area G1 (Sq. m)	Area G2 (Sq. m)	Reserves (G1)	Reserves (G2)	Total Reserves	Grade (%)		
		From	To									Fe	SiO_2	Al_2O_3
S1	MKDR 8	0.00	41.00	41.00	38.54	32.97	3223.2086	2626.9964	372001.67	303190.75	675192.42	50.79	15.38	8.45
S2	MKDR 8 (INFLUENCE)	0.00	41.00	41.00	38.54	28.41		3377.1365		335859.30	335859.30	50.79	15.38	8.45
S3	MKDR 7	3.00	31.00	28.00	26.32	30.05	2649.5518	1695.2071	278711.20	178321.93	457033.13	48.44	22.19	5.90
S4	MKDR 7 (INFLUENCE)	3.00	31.00	28.00	26.32	66.05		2733.9015		632110.80	632110.80	48.44	22.19	5.90
S6	MKDR 4	0.00	3.00	3.00	2.82	95.36	1326.8831		442931.36	0.00	442931.36	46.40	27.27	2.85
		19.00	25.00	6.00	5.64	95.36	409.2674		136618.94	0.00	136618.94	45.59	29.33	2.81
S7	MKDR 10	0.00	54.00	54.00	50.76	98.86	4609.6809		1595250.89	0.00	1595250.89	57.21	12.46	4.02
S8	MKDR 13	1.00	72.00	71.00	66.74	79.00	5137.7541		1420816.30	0.00	1420816.30	46.78	21.32	7.14
	MKD 19	0.00	31.25	31.25	29.38	79.00	4157.3938		1149703.31	0.00	1149703.31	48.68	13.36	2.02
S10	MKD 17	0.00	17.50	17.50	16.45	69.46	2982.8064		725266.09	0.00	725266.09	48.38	26.68	2.17
S11	MKDR 9	2.00	10.00	8.00	7.52	87.31	1036.8660		316901.39	0.00	316901.39	46.04	28.94	1.32
	MKD 18	0.00	9.45	9.45	8.88	87.31	742.3390		226883.96	0.00	226883.96	60.07	15.44	0.77
S12	MKDR 5	0.00	3.00	3.00	2.82	51.73	713.7969		129257.18	0.00	129257.18	65.44	3.65	2.60
		64.00	66.00	2.00	1.88	51.73	196.6940		35618.13	0.00	35618.13	47.53	28.27	1.49
		86.00	90.00	4.00	3.76	51.73	329.7887		59719.45	0.00	59719.45	45.40	24.74	7.75
S13	MKDR 2	0.00	26.00	26.00	24.44	64.58	3079.3545	1055.5729	696137.86	238629.32	934767.18	50.80	21.23	4.89
	MKDR 5 (INFLUENCE)	0.00	3.00	3.00	2.82	64.58		891.8536		201617.92	201617.92	65.44	3.65	2.60
S14	MKDR 1	0.00	18.00	18.00	16.92	90.26	1009.3002		318899.04	0.00	318899.04	59.01	12.36	2.25
	MKD 3	0.00	11.90	11.90	11.19	90.26	650.5888		205560.39	0.00	205560.39	45.27	16.53	12.51
					Geological In-situ Reserves						**10000007.18**			
					Net Reserves (Tonnes)						**9000006.46**	**50.95**	**18.42**	**4.69**
					Net Reserves (Million Tonnes)						**9.000**			

Resources (G3) for influence of BH MKDR 7 in Section S4

Sec. No.	BH No	From	To	Diff.	True Thick.	Sec. Inf.	G3 Area	Resources (G3)	Fe	SiO_2	Al_2O_3
S4	MKDR 7	3.00	31.00	28.00	26.32	66.05	1246.0270	288096.3798	48.44	22.19	5.90
					Total Net Reserves (Million Tonnes)			**Reserves + Resources 9.26 m.t.**	**50.89**	**17.9**	**4.56**

Table No.6: SECTION-WISE - BOREHOLE-WISE ORE RESERVES BY CROSS SECTION METHOD (at 55 % Fe cutoff) IN M/s KANHAIYALAL DUDHERIA MINE LEASE AREA ML NO. 2563

Section Number	Borehole Number	Intersection(m)		Diff (m)	True Width (m)	Average Sectional Influence (m)	Area G1 (Sq. m)	Area G2 (Sq. m)	Reserves (G1)	Reserves (G2)	Total Reserves	Grade (%)		
		From	To									Fe	SiO_2	Al_2O_3
S1	MKDR 8	8.00	31.00	23.00	21.62	32.97	1600.1822	983.1436	184682.57	113468.01	298150.58	58.03	8.22	6.27
S3	MKDR 7	15.00	23.00	8.00	7.52	30.05	670.2884	395.1687	70508.86	41568.52	112077.38	56.38	10.52	8.20
		25.00	27.00	2.00	1.88	30.05	164.8716	50.3020	17343.14	5291.36	22634.50	54.47	9.13	7.29
S7	MKDR 10	0.00	51.00	51.00	47.94	98.86	3731.9659		1291504.13		1291504.13	57.73	11.73	4.19
S8	MKDR 13	2.00	47.00	45.00	42.30	79.00	3404.2029		941412.70		941412.70	57.60	7.29	6.64
	MKD 19	0.00	17.20	17.20	16.17	79.00	2598.2418		718528.80		718528.80	61.55	7.86	2.64
S10	MKD 17	0.00	4.50	4.50	4.23	69.46	1957.3687		475932.04		475932.04	59.56	9.65	2.73
S11	MKD 18	0.00	6.40	6.40	6.02	87.31	619.9018		189463.00		189463.00	62.67	7.09	0.83
S12	MKDR 5	0.00	3.00	3.00	2.82	51.73	713.7969		129257.18		129257.18	65.44	3.65	2.60
S13	MKDR 2	0.00	10.00	10.00	9.40	64.58	1875.8150	903.8235	424058.30	204323.91	628382.22	60.59	7.98	4.67
S14	MKDR 1	0.00	15.00	15.00	14.10	90.26	734.4296		232050.78		232050.78	62.30	7.39	2.41
	MKD 3	8.90	11.90	3.00	2.82	90.26	185.5925		58639.91		58639.91	59.08	7.97	7.12
					Geological In-situ Reserves						**5098033.22**			
					Net Reserves (Tonnes)						**4588229.89**	**59.34**	**8.85**	**4.36**
					Net Reserves (Million Tonnes)						**4.588**			

CHAPTER-6

6.0.0 RELIABILITY OF ESTIMATION

6.1.0 FREQUENCY DISTRIBUTION

6.1.1 The entire primary sample data and sample data within the ore zone (>45% Fe) have been subjected to statistical evaluation, the frequency distribution is highly skewed as could be seen from the Text Plate-3, 4 and 5.

The statistical parameters estimated for primary sample data (1191 samples) is as follows:

No. of Samples	Fe	SiO_2	Al_2O_3
Mean	36.00	34.00	4.00
Standard deviation	0.076	0.033	0.238
Variance	0.005	0.001	0.056
Upper limit Lower limit (Confidence interval at 90%)	1.007 0.9927	1.000 1.000	1.013 0.9872
Sichel's "t" estimator	1.010	1.000	1.030

6.1.2 The zone data at 45% cut-off has been subjected to statistical studies comprising of 349 no. of primary samples and its parameters are given below.

The statistical parameters estimation of zone data

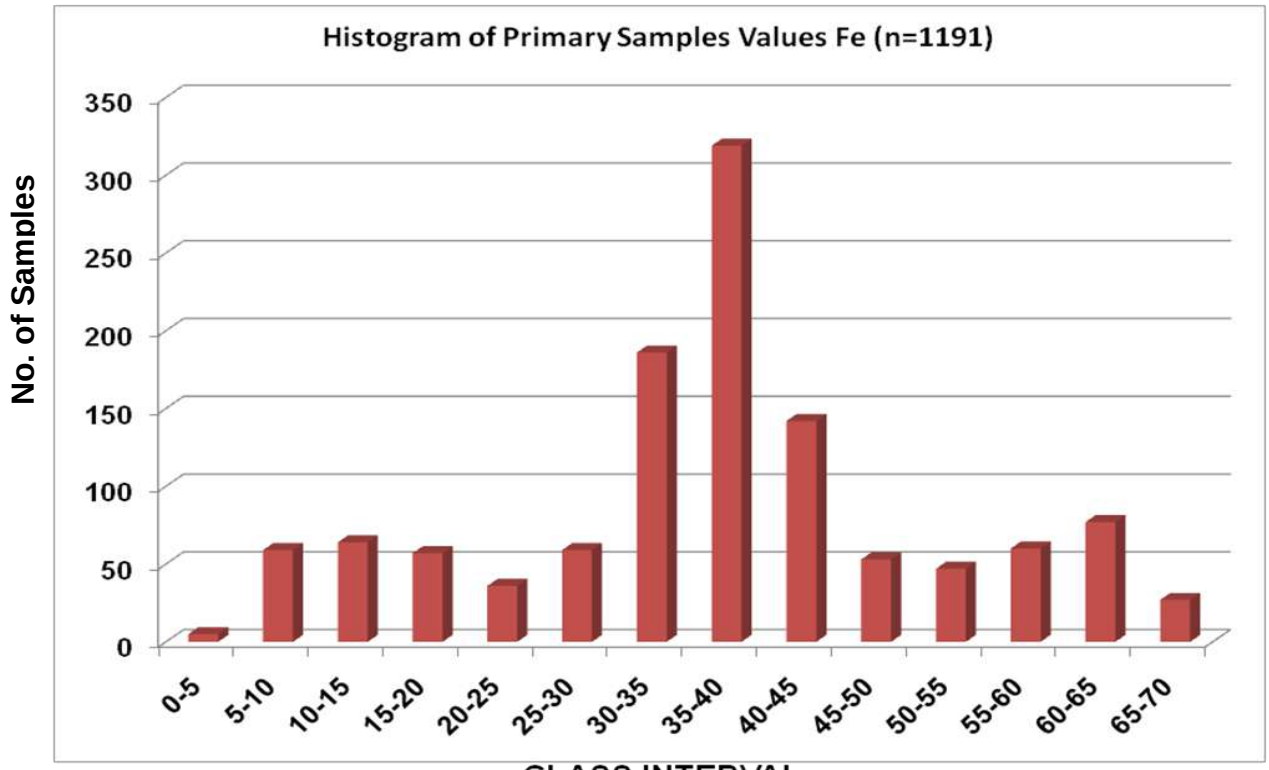
No. of Samples	Fe	SiO_2	Al_2O_3
Mean	52.00	17.00	5.40
Standard deviation	0.025	0.0875	0.13
Variance	0.0006	0.007	0.018
Upper limit Lower limit (Confidence interval at 90%)	1.007 0.9927	1.015 0.9852	1.007 0.9927
Sichel's "t" estimator	1.020	1.010	1.020

6.2.0 ACCURACY OF ANALYTICAL PROCEDURE

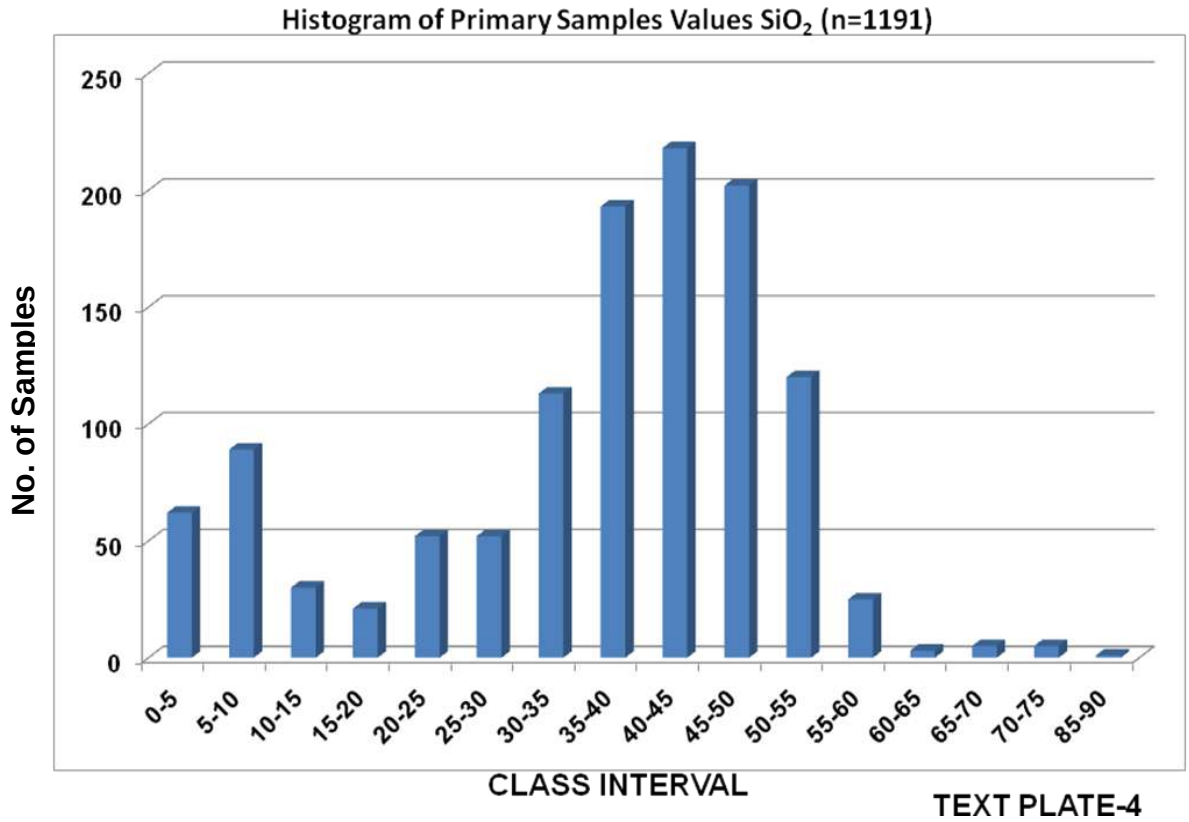
6.2.1 **Grade**: The grade estimates of the deposit are based on the results of samples of the boreholes. Each sample undergoes the process of sample preparation and analysis. Since, sampling and analysis are two complimentary links of quality estimation chain, the possible source of errors, if any, could be from the bias in sample preparation and inaccuracies in assaying or both. The plot of cumulative frequency for Fe,SiO_2 and Al_2O_3 radicals on log probability graph and table values obtained thereby have been produced in the Text Plate-6, 7 and 8 respectively.

6.2.2 **Mean**: The mean value obtained by statistical method as well as calculated values for three variables is given below:

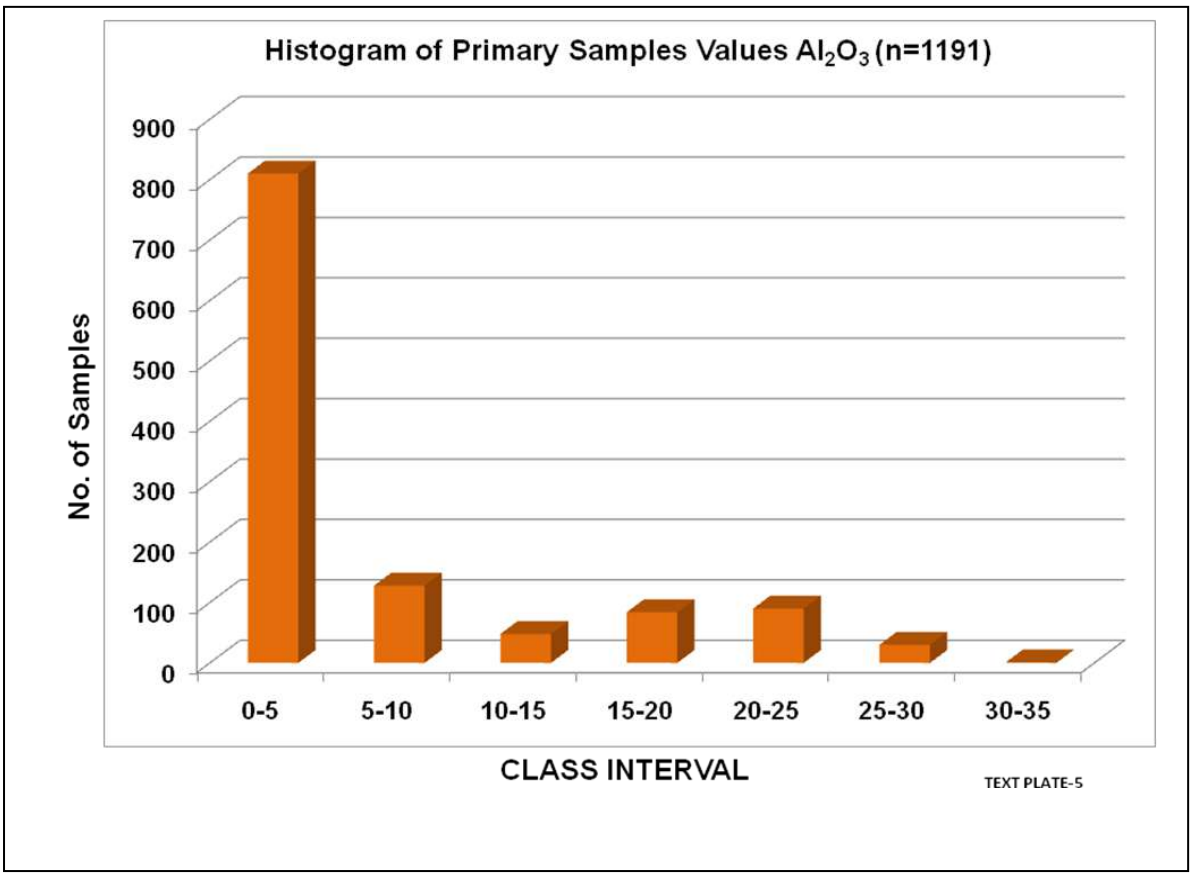
Between S1-S14	Fe	SiO_2	Al_2O_3
Statistical Method (entire data)	52.00	17.00	5.40
Sichel's "t" estimator(entire data)	1.020	1.010	1.020
Calculated (45% Fe)	50.89	17.9	4.56

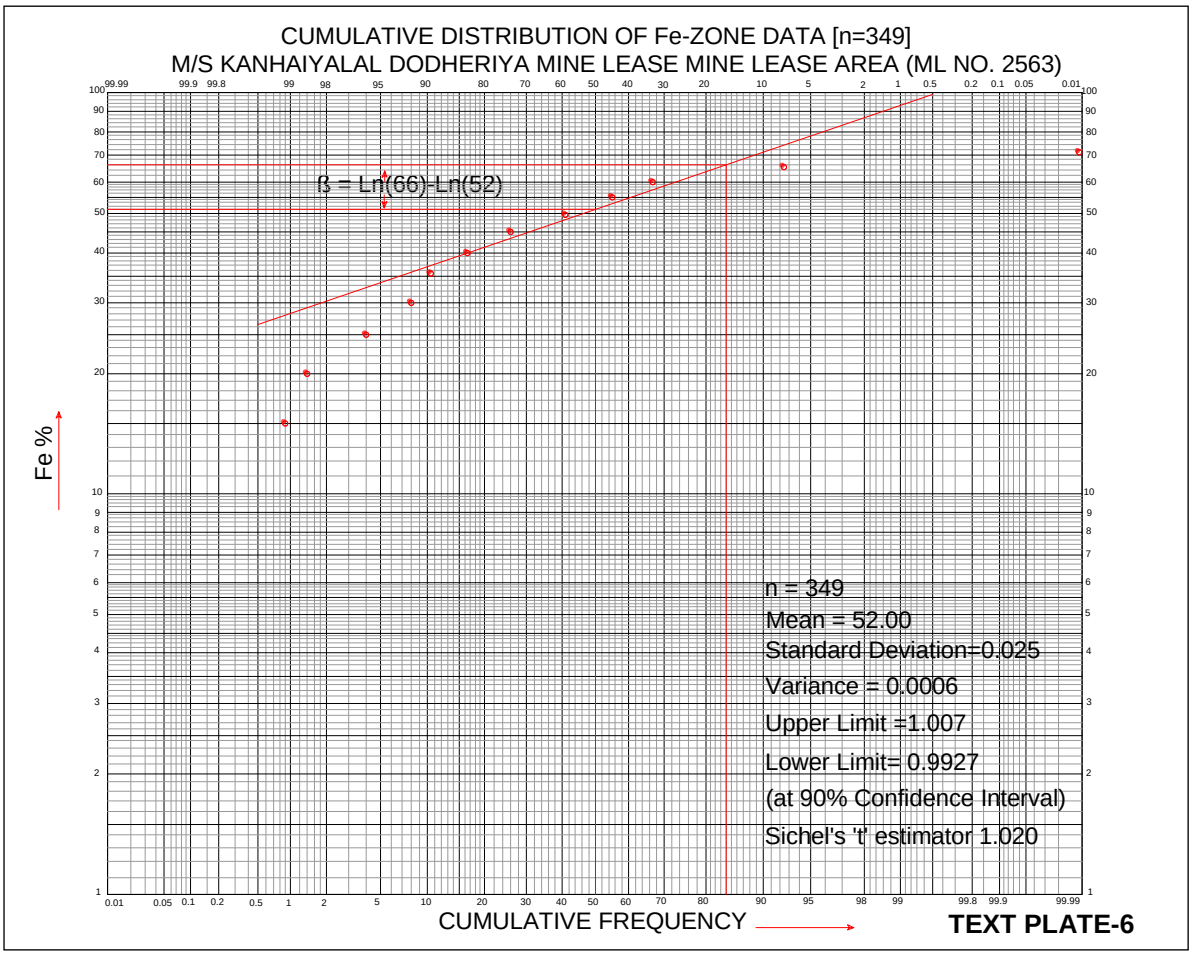


TEXT PLATE-3

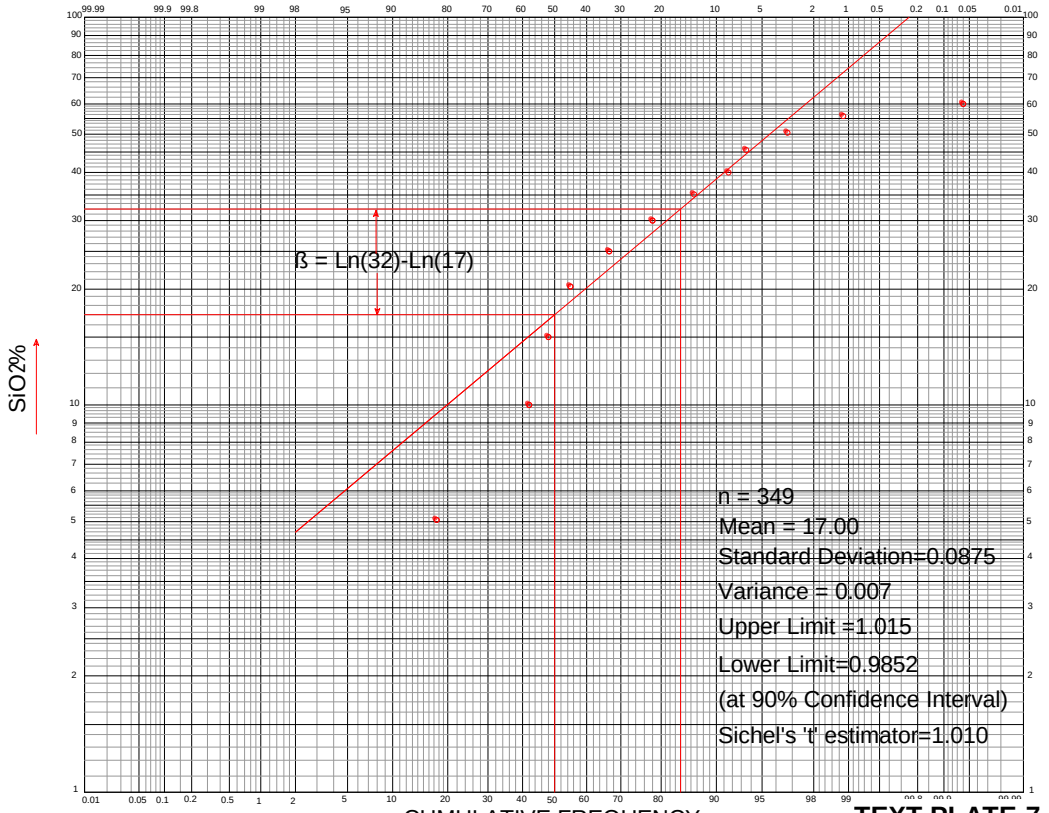


TEXT PLATE-4


Histogram of Primary Samples Values Al_2O_3 (n=1191)
No. of Samples
900
800
700
600
500
400
300
200
100
0
0-5
5-10
10-15
15-20
20-25
25-30
30-35
CLASS INTERVAL
TEXT PLATE-5

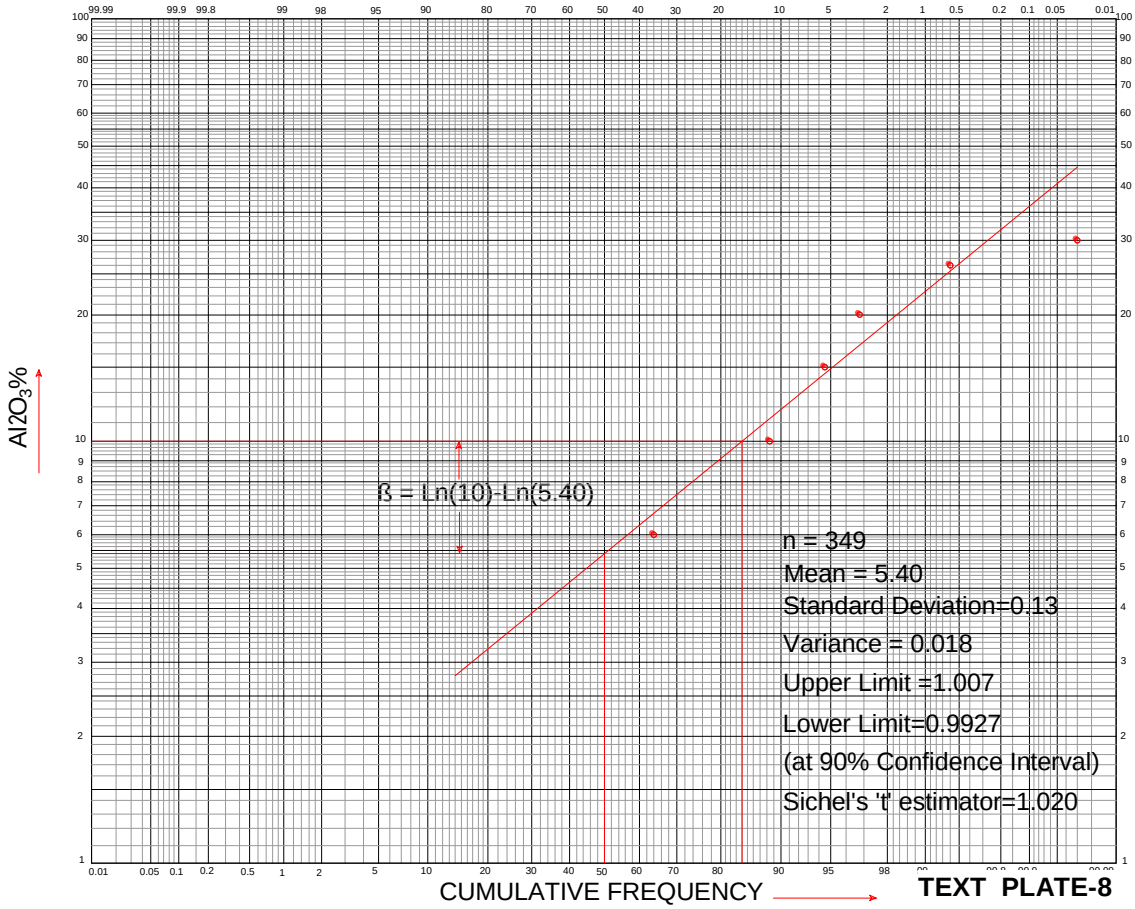

CUMULATIVE DISTRIBUTION OF Fe-ZONE DATA [n=349]
M/S KANHAIYALAL DODHERIYA MINE LEASE MINE LEASE AREA (ML NO. 2563)
β = Ln(66)-Ln(52)
Fe %
n = 349
Mean = 52.00
Standard Deviation=0.025
Variance = 0.0006
Upper Limit =1.007
Lower Limit= 0.9927
(at 90% Confidence Interval)
Sichel's 't' estimator 1.020
CUMULATIVE FREQUENCY
TEXT PLATE-6

CUMULATIVE DISTRIBUTION OF SiO_2-ZONE DATA [n=349]
M/S KANHAIYALAL DUDHERIYA MINE LEASE AREA (ML NO. 2563)



TEXT PLATE-7

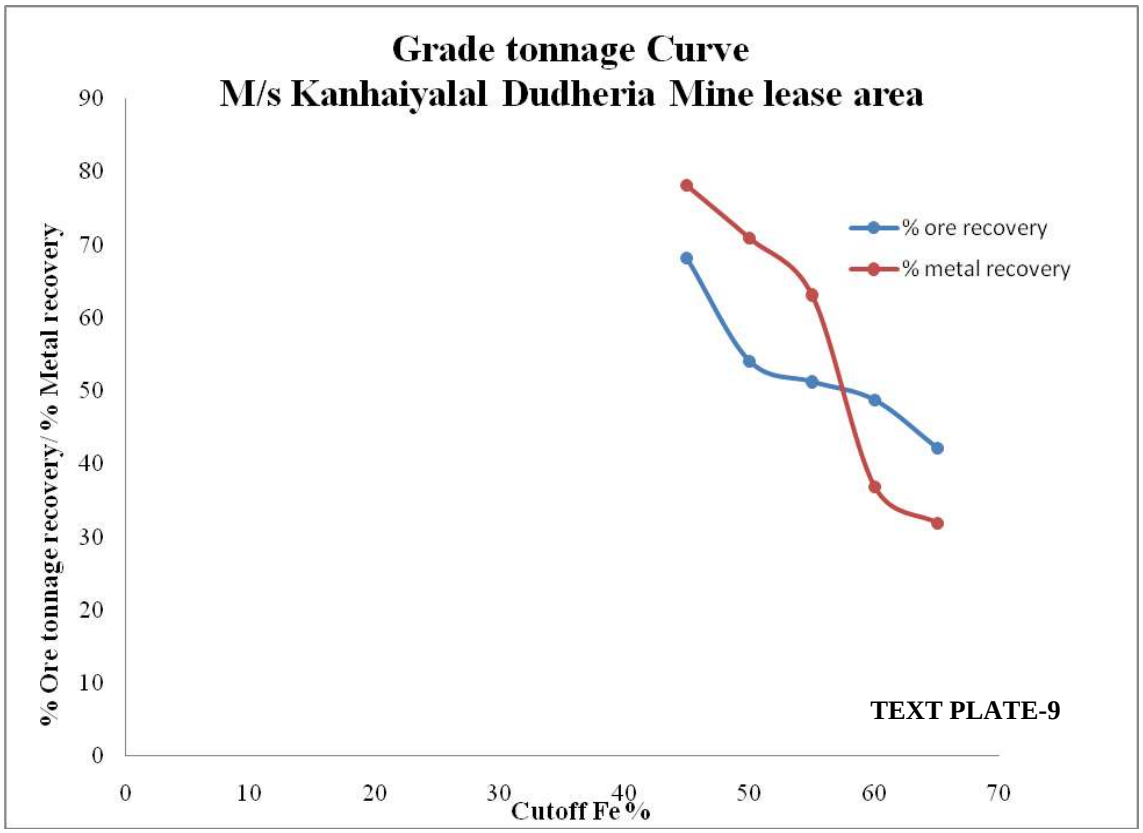
CUMULATIVE DISTRIBUTION OF $Al2O_3$-ZONE DATA [n=349]
M/S KANHAIYALAL DUDHERIYA MINE LEASE AREA (ML NO. 2563)



TEXT PLATE-8

6.3.0 GRADE, TONNAGE AND CURVE

6.3.1 Block variance obtained, after the log normal probability plot, of cumulative frequency of zone value, with the help of Formery's chart ore tonnage recovery and metal tonnage recovery have been deduced and the same has been plotted on to the graph paper (Text Plate No.9).



6.3.2 The step by step calculations have also been made for geo-statistical assessment of ore and metal recoveries and the same has been produced in the Table-7

Table-7
Geo-statistical assessment of Ore tonnage and Metal recoveries

Class Interval	E=f/n	CE	(ExA)x 100	C (ExA) x 100	Expected Mean Grade	Ore reserve (m.t)	Waste/ Ore	Metal (m.t)	% of Fe recovery
0-5	-	-	-	-	-	-	-	-	-
5-10	-	-	-	-	-	-	-	-	-
10-15	0.008	1.00	10.40	5160.20	51.60	9.260	0.00	4.778	100
15-20	0.005	0.986	8.50	5149.80	52.23	9.130	0.014	4.768	99.79
20-25	0.025	0.981	57.50	5141.30	52.40	9.074	0.020	4.754	99.49
25-30	0.040	0.956	112.00	5083.80	53.17	8.852	0.046	4.706	98.49
30-35	0.028	0.916	92.40	4971.80	54.27	8.482	0.091	4.603	96.337
35-40	0.060	0.888	298.00	4879.40	54.94	8.222	0.126	4.517	94.537
40-45	0.094	0.828	404.20	4651.40	56.17	7.667	0.207	4.306	90.121
45-50	0.143	0.734	686.40	4247.20	57.86	6.796	0.362	3.932	82.293
50-55	0.134	0.591	710.20	3560.80	60.25	5.472	0.692	3.296	68.982
55-60	0.134	0.457	777.20	2850.60	62.37	4.231	1.188	2.638	55.211
60-65	0.246	0.323	1549.80	2073.40	64.19	2.991	2.095	1.344	28.128
65-70	0.077	0.077	523.60	523.60	68.00	0.713	11.987	0.484	10.129

6.3.3 It is inferred from the above study that:

i) Quantity of ore reserve tonnage
ii) Metal tonnage
iii) Metal average grade
iv) Waste to ore ratio, which provides valuable information for mine planning decisions.

6.3.4 From the intercept of curves as shown in the text plate-9 it is imperative that planning beyond 56.66% Fe cut-off may not be feasible for the mine planning.

CHAPTER-7

7.0.0 CONCLUSIONS AND RECOMMENDATIONS

7.1.0 CONCLUSIONS

7.1.1 M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) is located on Ramgad range, Sandur schist belt in NNW-SSE direction with steep easterly dip of 75° - 85°. The deposit extends over 951.00m strike length over an average wide area of 25.00m-160.00m.

7.1.2 Ore body looks like an elongated ore bands and continues up to and beyond explored depth of 725.306m RL (MKDR-15).

7.1.3 The rocks exposed are typical of iron formations with the haematitic ore, soft laminated ore, powdery ore, clay minerals and silica. The predominant ore minerals are haematite and limonite and goethite to some extent. The important non ore consists mostly of banded haematite quartzite rarely ferruginous shale and intrusive ferruginous clay.

7.1.4 Generally the iron ore ranges from haematitic ore to laminated and powdery ores; the siliceous ore and blue dust have also been encountered in the mine lease area.

7.1.5 Based on the geological cross section, the net in-situ reserves of 9.26 m.t. of iron ore with 50.89% Fe, 17.9% SiO_2 and 4.56% Al_2O_3 at 45% Fe cut off has been estimated. The overall ratio of SiO_2: Al_2O_3 is 0.25.

7.1.6 At 55% Fe cut-off the net in-situ reserves estimated is 4.588 million tonnes with average grade of Fe 59.34%, 8.85% SiO_2, 4.36 Al_2O_3.

7.1.7 After critical study along N60ºW-S60ºE direction and the behaviour of ore bands has been studied which shows that the ore body persists even beyond the earlier exploited depth of 725.306m RL (MKDR-15). Moreover at the planning cut-off of 35% Fe, the mineralized zone persists over the entire strike length of 951.00m over wide area of 65–155m with average thickness of 57.00m. The resources estimated are 20.400 m.t. with 41.64% Fe.

7.1.8 From the intercept of curves as shown in the Text Plate-9 it is imperative that planning beyond 56.66% cut-off may not be feasible for the mine planning.

7.2.0 RECOMMENDATIONS

7.2.1 M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) has good potential at 45% Fe cutoff, which would be amenable to systematic scientific mining over the strike length of 794.04m with average thickness of 36.37m having ore resources of 9.26 million tonnes with an average grade of 50.89% Fe, 17.9% SiO_2 and 4.56% Al_2O_3.

References:

1	Document on strategy for exploration, exploitation and development for Iron Ore in India.	Sub group on Iron Ore, Government of India, and MOM.	Jan-2006
2	Preliminary appraisal of the Ballari Hospet Iron Ore Deposits, Ballari Division, Mysore.	K. Ganeshan and R.C. Vidyarthi, IBM, Nagpur.	March-1964
3	Archaean Greenstone belts of South India	B. P. Radhakrishna M. Ramakrishnan	Geological Society of India, Bengaluru, 1990
4	Geology of Karnataka	BP Radhakrishna R. Vaidyanathan	Geological Society of India
5	Computing reserves of Mineral deposits : Principles and Conventional methods	Constantine C. Popff	USBM, 1965
6	Economic Mineral Deposits Revised Edition	Mead L. Jensen and Alan M. Bateman	John liley and Sons New York 1951
7	Economic Evaluation of Mineral Property	Sam L. Vanlandangham	Huchinson Press Publishing Co. Pennsylvania 1983
8	Geo-statistical Ore Reserve Estimation	M. David	Elsevier Scientific Publishing Co. Netherlands, 1977
9	Exploration Report	Far Eastern section BRH Iron Ore Mine, Dist. Ballari, Karnataka	MECL, Sept, 1996
10	Exploration Report	Bailadila Iron Ore Deposit No.4	NMDC, Hyderabad, Andhra Pradesh
11	Exploration Report	Rowghat Iron Ore Deposit ‘F’, Block-A Phase-I, Dist. Bastar, Madhya Pradesh	MECL, Dec, 1991
12	Exploration Report	Chiria Iron Ore Deposit, Phase-I, Dist. Singhbhum, Bihar	MECL, March, 1974
13	Vision 2020		IBM
14	Mineral Year Book 2012		IBM
15	Special Issue on Iron Ore Future- Next Decade	Journal of Mines, Metals and Fuels	Mar/Apr-2010

PERSONNEL ASSOCIATED

1. **Overall Guidance**

Shri S.K. Thakur	General Manager (Exploration)

2. **Monitoring and Co-ordination**

Shri S.K. Thakur	General Manager (Exploration)
Shri D. Mohan	Sr. Manager(Geology)

3. **Physical Execution of work**

Shri P. Sekar	Sr. Manager(Geology) / P.M.
Shri Santosh Kumar Satpathy	Sr. Geologist
Shri Sandeep Sarangi	Geologist
Shri Ujjwal Shekhar	E.T. (Geology)
Shri A.K. Ghosh	ASMO
Shri S.N. Dhyani	ASMO
Shri H. R. Mallick	Sr. Survey and Map Officer

4. **Geological Mapping**

Shri Santosh Kumar Satpathy	Sr. Geologist

5. **Data Processing and Documentation**

Dr. S. Kamalakaram	Sr. Manager (Geology)
Shri J. Narayana Moorthy	Sr. Manager (Geology)
Shri Akhil Kumar Dwivedi	Geologist
Shri Mayank Dixit	Geologist
Shri B.P. Raturi	Dy. G.M. (Exploration)

6. **Chemical Laboratory, MECL, Nagpur**

Shri PC Khot	Manager (Lab.)

7. **Petrological Laboratory, MECL, Nagpur**

Shri Sayantan Pal	Sr. Geologist
Dr. Anjani Kumar	Sr. Manager (Geology)

8. **IT Centre**

Shri ADP Rao	Sr. Manager (Systems)
Shri B. Umapathy	Sr. Manager (Geology)
Shri K.K. Kaushik	Sr. Manager (Geology)
Shri Rahul Mathankar	Sr. Programmer (Systems)
Shri Philip Varghese	Sr. Console Operator
Shri N.C.S.Reddy	Jr. Console Operator

9. **Reprography**

Shri V.K.Tayawade	Jr. Tech. (S&M)
Shri P. Keshav Rao	Jr. Tech. (S&M)

PART –IV A
REPORTING OF MINERAL RESOURCES

Sl.no	Contents	Explanation
1	Title & Ownership	M/s KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No.2563), RAMGAD RANGE, SANDUR SCHIST BELT,DISTRICT: BALLARI, KARNATAKA, GOVT.KARNATKA Period of prospecting:January 2016 – February 2016
2	Details of the area	Longitudes 76º25'02.00" and 76º26'06.3" and Latitudes 15º10'07.8" and 15º10'37.3". The block falls in Ramanadurga village of Ramgad range. The block is covered in Survey of India Topo sheet No.57 A/8. Lease area is 30.09 Hectares.
3	Infrastructure and environment	The mine lease area is 20 km from Sandur town which can be approached from Bellary, Hospet, Donimalai and from Toranagallu railway station.
4	Previous Exploration	Nil; while the mine area has been exploited for iron ore
5	Geology	The Sandur Schist Belt is known for its economic deposits of Iron and Manganese and studied in detail by many prominent workers like New Bold (1838), Foote (1895), Roy and Biswas(1983), Martin and Mukhopadhyay (1987 & 1993), Naqvi et.al. (1987) on various aspects like depositional environment, structure etc. Iron ore, banded ferruginous cherty quartzite, are intimately associated with gabbro of pre-tectonic and post tectonic origin. The hill ranges trend in NNW-SSE direction, which are similar to regional tectonic trend of the Sandur Schist Belt. The area has under gone two phases of deformation [F1 and F2] and metamorphism. The axial trace of F1 have NNW-SSE trend which is refolded by open F2 folds trending in ENW-WSE direction. The primary structure of banded iron ore formation is bedding and pene-contemporaneous faults; schistosity and fracture cleavage are also common. Repetition of iron ore bands, which cause the thickening of ore at places, are due to diastrophic folds. Average strike Length of the iron ore zone-701.42m Average wide - 25-160.00m Average thickness - - 36.37m
6	Aerial/Ground/Geophysical /Geochemical data	--
7	Technological Investigation	Exploratory drilling at 100m x 100m within mineralized zone and 200m x 200m in other areas (G1 / G2 level of UNFC)
8	Location of data points	Provided in the topographical and geological map on 1:1000 scale

Sl.no	Contents	Explanation
9	Sampling techniques	The core recovered by drilling was divided into two longitudinal halves. One half was taken for sampling, whereas the second half was kept for future reference [with DGM, Karnataka]. The first half was subjected to uniform size reduction of 1mm size. It is thoroughly mixed pounded and powdered to (-) 100 mesh size by pestle and mortar and then coned and quartered. 3 sample packets of 100 gram each have been prepared; out of the three, one packet was handed over to DGM, Karnataka and the other one has been labeled and sent to MECL laboratory for Fe, SiO_2 and Al_2O_3 analyses, whereas the third packet has preserved for future reference. The entire lot of chips and powder material were collected from boreholes drilled by Reverse Circulation drill. 50% mostly of chip samples have been thoroughly mixed to have the desired quantity of 500-600 gms. and pounded to (-)100 mesh size by progressive reduction, 3 sample packets of 200 gram each has been prepared; out of the three, one has been labeled and sent to MECL lab. for Fe, SiO_2 and Al_2O_3 analyses and the other packet was handed over to DGM, Karnataka, and the 3rd packet of the sample has been preserved for further studies at camp.
10	Drilling Technique and drill sampling employed	Exploratory core drilling - 233.30m (4 BHs) RC Drilling - 1045.00m (15 BHs) Total Drilling - 1278.30m (19 BHS)
11	Sub sampling techniques and sample preparation	As explained above at Sl.no.9
12	Quality of assay data and laboratory tests	Assayed at MECL Lab. by classical method; by MECL, Chemical Laboratory, Utilities Complex, Nagpur by XRF method.
13	Moisture	-
14	Bulk Density	Determined bulk density is 3.11 and 3.02. Specific gravity determined on 4 no. of samples. However, a realistic bulk density of 3.50 has been considered for reserves estimation.
15	Lumps Fines	26.75% 73.25%
16	Reserves estimation techniques	Iron ore reserves have been estimated by geological cross section method. In order to delineate the ore and non-ore, the grade or threshold value of 45% Fe has been adopted, thus non ore above and below ore zones has been demarcated. The rule of gradual change or law of linear function has been applied [Constantine C. Popoff, 1965] along with the rule of nearest points for application of influence of half way between successive boreholes.

<table>
<tr><th>Sl.no</th><th>Contents</th><th>Explanation</th></tr>
<tr><td></td><td></td><td>At threshold cutoff of 45% Fe as stipulated by IBM, the mineralized zone within the lease hold area and the ore reserves are estimated.
<table>
<tr><th>Cross Section</th><th>Strike length (m)</th><th>Average thick (m)</th><th>Reserves (in Mt)</th><th>Grade Fe%</th><th>Metal Content (in Mt)</th><th>Remarks (Fe %Cutoff)</th></tr>
<tr><td>S1 to S4,S6 to S8 & S10 to S14</td><td>794.04</td><td>36.37</td><td>9.260</td><td>50.89</td><td>4.712</td><td>45</td></tr>
<tr><td>S1,S3,S7,S8,S10 to S14</td><td>604.22</td><td>29.11</td><td>4.588</td><td>59.34</td><td>2.722</td><td>55</td></tr>
<tr><td>S1 to S14</td><td>951.00</td><td>57.00</td><td>20.400</td><td>41.64</td><td>8.494</td><td>35 (planning cut-off)</td></tr>
</table>
Raw assay data and zone data have been subjected for statistical studies to derive various parameters including sichel's `t' estimator.</td></tr>
<tr><td>17</td><td>Mineralised Area</td><td>Mineralised Area: - 0.12 Sq.km
Non-mineralised Area - 0.18 Sq.km
Broken Area: - 0.12 Sq.km
Non-broken Area - 0.18 Sq.km.
Lumps - 26.75%
Fines - 73.25%</td></tr>
<tr><td>18</td><td>Further work</td><td>The associated mining company lease area ML No.2434 with an area of 10.14ha is adjacent to M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) towards east. Hence, for the scientific mining and subsequent exploitation of the ore, the mine may be auctioned together.</td></tr>
<tr><td>19</td><td>Annexure/enclosures to the report</td><td>MECL reports includes all the relevant maps, sections, logs, analytical reports & fields photos</td></tr>
<tr><td>20</td><td>Any other information</td><td>M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) has potential that would be amenable to systematic scientific mining. However, it has good ore resource potential, over the entire mine lease area at the planning cut-off of 35% Fe is 20.400 m.t. with an average thickness of 57.00m, av. grade of 41.64% Fe, which would further augment the ore resources.</td></tr>
</table>

CERTIFICATE

This is to certify that the details exploration for iron ore has been carried out in M/s Kanhaiyalal Dudheria Mine Lease Area (ML No.2563) district Ballari, Karnataka by Mineral Exploration Corporation Limited (MECL on behalf of Department of Mines & Geology (DMG), Karnataka. The exploration has been done upto G1 and G2 level of UNFC and the report has been prepared in accordance with the Minerals (Evidence of Mineral Contents) Rule 2015 specified under Mineral Auction Rule, 2015. The duly filled in format Part-IV-A of the report as per MEMC Rule is attached herewith.

(Signature)
Mineral Exploration Corporation Limited
(CPSE under Ministry of Mines, Govt. of India
Nagpur,Maharashtra

ANNEXURE-II

DETAILS OF SURVEY PARTICULARS OF BOREHOLES DRILLED BY MECL
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

SL NO.	BOREHOLE NO.	CO-ORDINATES		REDUCED LEVEL (m)	ANGLE (DEG.) m)	BEARING (DEG.)	TOTAL DEPTH	DATE OF COMMENCEMENT	DATE OF CLOSURE
		LATITUDE	LONGITUDE						
1	MKDR-1	1677604.270	653986.433	884.986	60	S60°W	80.00	04/02/16	05/02/16
2	MKDR-2	1677666.929	653891.445	882.474	90		90.00	04/02/16	05/02/16
3	MKD-3	1677626.093	654021.455	880.014	90		75.50	04/02/16	16/02/16
4	MKDR-4	1678054.568	653562.026	891.461	55	S60°W	61.00	05/02/16	05/02/16
5	MKDR-5	1677733.610	653952.350	875.130	58	S60°W	95.00	05/02/16	07/02/16
6	MKDR-6	1678108.620	653473.335	884.320	90		43.00	05/02/16	06/02/16
7	MKDR-7	1678254.230	653461.634	867.555	60	S60°W	49.00	06/02/16	06/02/16
8	MKDR-8	1678299.200	653425.818	877.043	90		85.00	06/02/16	07/02/16
9	MKDR-9	1677750.922	653829.943	874.993	90		80.00	08/02/16	08/02/16
10	MKDR-10	1677973.804	653621.646	908.151	90		121.00	08/02/16	09/02/16
11	MKDR-11	1678023.604	653694.518	865.492	90		51.00	09/02/16	09/02/16
12	MKDR-12	1677901.680	653813.536	863.363	90		50.00	09/02/16	09/02/16
13	MKDR-13	1677876.451	653654.295	911.686	90		75.00	09/02/16	10/02/16
14	MKDR-14	1678207.223	653609.529	797.330	60	S60°W	35.00	11/02/16	11/02/16
15	MKDR-15	1678328.578	653513.103	830.306	90		105.00	12/02/16	12/02/16
16	MKDR-16	1678283.410	653555.248	823.415	90		25.00	12/02/16	12/02/16
17	MKD-17	1677835.931	653779.732	883.106	60	S60°W	46.60	13/02/16	17/02/16
18	MKD-18	1677783.706	653888.092	874.392	90		53.00	17/02/16	21/02/16
19	MKD-19	1677924.715	653733.017	881.658	60	S60°W	58.20	23/02/16	26/02/16

ANNEXURE-IIIB/1

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-1

LATITUDE : 1677604.270
LONGITUDE : 653986.433
REDUCED LEVEL (M): 884.986

DATE OF COMMENCEMENT : 04/02/16
DATE OF CLOSURE : 05/02/16
DEPTH DRILLED (M) : 80.00

DEPTH (M) FROM	TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	POWDERY ORE	STEEL GREY	63.35	5.76	2.31	
1.00	2.00	1.00	POWDERY ORE	STEEL GREY	62.49	7.38	2.41	
2.00	3.00	1.00	POWDERY ORE	STEEL GREY	62.22	6.90	2.63	
3.00	4.00	1.00	POWDERY ORE	STEEL GREY	63.66	5.67	2.62	
4.00	5.00	1.00	POWDERY ORE	STEEL GREY	62.41	7.35	2.70	
5.00	6.00	1.00	POWDERY ORE	GREY	41.67	35.42	3.93	HAEMATITE PIECES
6.00	7.00	1.00	POWDERY ORE	GREY	64.29	4.85	2.17	HAEMATITE PIECES
7.00	8.00	1.00	POWDERY ORE	GREY	62.93	5.95	2.99	HAEMATITE PIECES
8.00	9.00	1.00	POWDERY ORE	GREY	65.19	3.90	1.72	HAEMATITE PIECES
9.00	10.00	1.00	POWDERY ORE	GREY	64.09	4.42	1.89	HAEMATITE PIECES
10.00	11.00	1.00	POWDERY ORE	GREY	64.73	3.83	1.95	HAEMATITE PIECES
11.00	12.00	1.00	POWDERY ORE	GREY	64.81	4.18	2.01	HAEMATITE PIECES
12.00	13.00	1.00	POWDERY ORE	GREY	64.46	4.42	2.19	
13.00	14.00	1.00	POWDERY ORE	GREY	63.96	5.81	2.46	
14.00	15.00	1.00	POWDERY ORE	GREY	64.26	4.95	2.17	HAEMATITE PIECES
15.00	16.00	1.00	POWDERY ORE	LIGHT BROWN	47.39	30.44	1.59	HAEMATITE PIECES
16.00	17.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.05	50.51	1.11	
17.00	18.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	47.28	30.80	1.56	
18.00	19.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.69	52.07	0.74	
19.00	20.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.14	51.43	1.12	
20.00	21.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	35.74	29.10	10.48	
21.00	22.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	39.66	23.86	10.67	
22.00	23.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	41.56	23.64	10.74	
23.00	24.00	1.00	SOFT LAMINATED ORE	DARK GREY	44.44	34.27	2.05	

ANNEXURE-IIIB/2

BOREHOLE NO:MKDR-1

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	SOFT LAMINATED ORE	GREY BROWN	38.64	38.48	1.91	
25.00	26.00	1.00	SOFT LAMINATED ORE	GREY BROWN	40.64	37.60	1.55	
26.00	27.00	1.00	SILICEOUS IRON ORE	GREY	38.82	40.34	1.10	
27.00	28.00	1.00	SILICEOUS IRON ORE	GREY	40.84	37.98	1.33	
28.00	29.00	1.00	SILICEOUS IRON ORE	GREY	38.34	40.65	0.83	
29.00	30.00	1.00	SILICEOUS IRON ORE	GREY	41.14	38.38	0.89	
30.00	31.00	1.00	SILICEOUS IRON ORE	GREY	37.55	41.63	0.88	
31.00	32.00	1.00	SILICEOUS IRON ORE	GREY	36.37	44.13	0.73	
32.00	33.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	37.57	44.26	0.91	
33.00	34.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	37.91	43.65	1.17	
34.00	35.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	36.33	45.01	0.91	
35.00	36.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	40.40	39.74	1.05	
36.00	37.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	38.21	43.05	0.97	
37.00	38.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	36.98	45.20	1.63	
38.00	39.00	1.00	SILICEOUS IRON ORE	GREY BROWN	34.93	46.88	1.59	
39.00	40.00	1.00	SILICEOUS IRON ORE	GREY BROWN	36.42	45.00	1.18	
40.00	41.00	1.00	SILICEOUS IRON ORE	GREY BROWN	38.31	41.87	1.20	
41.00	42.00	1.00	SILICEOUS IRON ORE	GREY BROWN	37.03	43.98	1.84	
42.00	43.00	1.00	SILICEOUS IRON ORE	GREY BROWN	35.74	45.76	1.56	
43.00	44.00	1.00	SILICEOUS IRON ORE	GREY BROWN	37.68	43.09	1.11	
44.00	45.00	1.00	SILICEOUS IRON ORE	GREY BROWN	35.49	46.52	0.81	
45.00	46.00	1.00	SILICEOUS IRON ORE	GREY BROWN	35.85	46.52	2.02	
46.00	47.00	1.00	SILICEOUS IRON ORE	GREY BROWN	36.54	45.24	1.95	
47.00	48.00	1.00	SILICEOUS IRON ORE	GREY BROWN	36.22	44.47	1.59	
48.00	49.00	1.00	SILICEOUS IRON ORE	GREY BROWN	37.16	43.38	1.45	
49.00	50.00	1.00	SILICEOUS IRON ORE	GREY BROWN	37.95	42.97	2.73	
50.00	51.00	1.00	SILICEOUS IRON ORE	GREY BROWN	40.91	39.52	0.98	
51.00	52.00	1.00	SILICEOUS IRON ORE	GREY BROWN	38.20	42.37	0.74	
52.00	53.00	1.00	SILICEOUS IRON ORE	GREY BROWN	35.12	46.43	0.39	
53.00	54.00	1.00	SILICEOUS IRON ORE	GREY BROWN	35.00	47.14	0.39	
54.00	55.00	1.00	SILICEOUS IRON ORE	GREY BROWN	34.64	48.76	0.45	

ANNEXURE-IIIB/3

BOREHOLE NO:MKDR-1

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	SILICEOUS IRON ORE	GREY BROWN	34.94	45.53	0.40	
56.00	57.00	1.00	SILICEOUS IRON ORE	GREY BROWN	32.16	50.75	0.55	
57.00	58.00	1.00	SILICEOUS IRON ORE	GREY BROWN	32.14	52.78	1.10	
58.00	59.00	1.00	SILICEOUS IRON ORE	GREY BROWN	32.34	50.35	3.35	
59.00	60.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.98	45.52	1.53	
60.00	61.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.47	46.32	1.40	
61.00	62.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.13	48.61	0.64	
62.00	63.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.21	52.29	1.27	
63.00	64.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.14	52.13	1.86	
64.00	65.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.83	50.44	1.57	
65.00	66.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.89	49.27	1.62	
66.00	67.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.69	49.29	2.08	
67.00	68.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.81	50.62	1.76	
68.00	69.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.88	48.93	1.96	
69.00	70.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	33.67	46.00	3.57	
70.00	71.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	62.99	6.67	3.12	
71.00	72.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	40.28	36.97	1.77	
72.00	73.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	36.97	38.81	2.36	
73.00	74.00	1.00	SILICEOUS POWDER+ORE PIECES	GREY BROWN	40.79	38.12	1.01	
74.00	75.00	1.00	FERRUGINOUS SHALE	YELLOW	14.06	35.91	25.05	
75.00	76.00	1.00	FERRUGINOUS SHALE	YELLOW	11.68	38.30	21.83	
76.00	77.00	1.00	FERRUGINOUS SHALE	YELLOW	17.21	39.11	23.33	
77.00	78.00	1.00	FERRUGINOUS SHALE	YELLOW	14.58	42.62	22.87	
78.00	79.00	1.00	FERRUGINOUS SHALE	YELLOW	37.05	45.45	1.17	
79.00	80.00	1.00	FERRUGINOUS SHALE	YELLOW	14.38	37.56	15.12	

ANNEXURE-IIIB/4

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-2

LATITUDE : 1677666.929
LONGITUDE : 653891.445
REDUCED LEVEL (M): 882.474

DATE OF COMMENCEMENT : 04/02/16
DATE OF CLOSURE : 05/02/16
DEPTH DRILLED (M) : 90.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	SOFT LAMINATED ORE	DARK GREY	60.03	7.67	6.35	
1.00	2.00	1.00	SOFT LAMINATED ORE	DARK GREY	60.16	7.63	6.13	
2.00	3.00	1.00	SOFT LAMINATED ORE	DARK GREY	58.43	8.11	8.27	
3.00	4.00	1.00	SOFT LAMINATED ORE	DARK GREY	61.03	6.49	6.07	
4.00	5.00	1.00	SOFT LAMINATED ORE	DARK GREY	60.86	6.59	6.28	
5.00	6.00	1.00	SOFT LAMINATED ORE	DARK GREY	63.68	5.91	2.85	
6.00	7.00	1.00	SOFT LAMINATED ORE	DARK GREY	62.19	7.16	2.65	
7.00	8.00	1.00	SOFT LAMINATED ORE	DARK GREY	62.54	6.72	2.79	
8.00	9.00	1.00	SOFT LAMINATED ORE	DARK GREY	61.31	8.03	2.30	
9.00	10.00	1.00	SOFT LAMINATED ORE	DARK GREY	55.63	15.49	2.97	
10.00	11.00	1.00	SOFT LAMINATED ORE	DARK GREY	50.37	23.63	4.00	
11.00	12.00	1.00	SOFT LAMINATED ORE	DARK GREY	48.02	26.87	4.44	SILICEOUS
12.00	13.00	1.00	SOFT LAMINATED ORE	DARK GREY	46.81	27.59	4.00	
13.00	14.00	1.00	RED OCHRE	DARK GREY	41.11	35.18	2.92	
14.00	15.00	1.00	RED OCHRE	DARK GREY	40.06	35.65	3.10	
15.00	16.00	1.00	RED OCHRE	DARK GREY	41.77	33.90	3.17	
16.00	17.00	1.00	RED OCHRE	DARK GREY	47.98	23.26	8.03	
17.00	18.00	1.00	RED OCHRE	DARK GREY	47.72	24.41	7.15	
18.00	19.00	1.00	RED OCHRE	DARK GREY	50.56	21.52	6.10	
19.00	20.00	1.00	RED OCHRE	DARK GREY	50.38	21.57	6.33	
20.00	21.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	41.00	33.13	4.60	
21.00	22.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	40.11	35.46	4.08	
22.00	23.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	39.81	36.76	4.01	
23.00	24.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	39.93	34.40	5.75	

ANNEXURE-IIIB/5

BOREHOLE NO:MKDR-2

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT GREY	42.31	34.01	4.77	
25.00	26.00	1.00	SILICEOUS POWDER+ORE PIECES	DARK GREY	46.88	24.97	7.95	
26.00	27.00	1.00	SILICEOUS POWDER+ORE PIECES	DARK GREY	39.83	34.08	6.33	
27.00	28.00	1.00	SILICEOUS POWDER+ORE PIECES	DARK GREY	42.55	30.76	7.97	
28.00	29.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.95	34.04	7.14	
29.00	30.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.55	37.81	6.46	
30.00	31.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.28	42.71	4.63	
31.00	32.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.20	37.79	5.43	
32.00	33.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.55	36.91	6.02	
33.00	34.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.00	39.52	3.90	
34.00	35.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.47	33.92	4.42	
35.00	36.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.61	40.68	3.10	
36.00	37.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.57	33.87	3.45	
37.00	38.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.46	35.53	3.05	
38.00	39.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	43.55	31.92	3.55	
39.00	40.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.58	35.56	3.55	
40.00	41.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.01	37.00	5.63	
41.00	42.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.60	40.00	5.08	
42.00	43.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.25	35.77	6.58	
43.00	44.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.64	41.26	2.54	
44.00	45.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.89	39.54	3.96	
45.00	46.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.83	35.30	6.09	
46.00	47.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.54	37.43	3.06	
47.00	48.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.32	38.38	3.36	
48.00	49.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	39.26	39.11	2.76	
49.00	50.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	37.95	35.96	5.67	
50.00	51.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	37.61	40.42	3.22	
51.00	52.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	36.86	39.61	5.94	
52.00	53.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.23	40.01	2.12	
53.00	54.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	35.08	41.76	3.63	
54.00	55.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.92	37.75	7.21	

ANNEXURE-IIIB/6

BOREHOLE NO:MKDR-2

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	29.84	43.10	5.57	
56.00	57.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	34.59	43.06	3.18	
57.00	58.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	36.60	33.48	7.01	
58.00	59.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	40.05	39.02	2.11	
59.00	60.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	42.80	35.82	1.66	
60.00	61.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	36.91	43.38	1.32	
61.00	62.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.68	40.30	1.79	
62.00	63.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.76	40.28	0.56	
63.00	64.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.73	40.12	1.22	
64.00	65.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.97	40.24	1.09	
65.00	66.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	30.02	54.24	0.84	
66.00	67.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	29.17	54.83	0.76	
67.00	68.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	25.18	59.55	0.79	
68.00	69.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	31.57	52.24	0.89	
69.00	70.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	33.01	46.42	0.83	
70.00	71.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	33.15	44.39	1.37	
71.00	72.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	29.90	54.00	0.91	
72.00	73.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	37.91	42.00	0.66	
73.00	74.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.54	47.70	0.69	
74.00	75.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.16	48.55	0.45	
75.00	76.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	35.93	43.52	0.86	
76.00	77.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	33.04	46.09	0.70	
77.00	78.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	34.41	43.56	0.48	
78.00	79.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.75	38.41	0.40	
79.00	80.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.98	38.91	0.53	
80.00	81.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.86	46.96	0.82	
81.00	82.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	35.08	44.17	0.47	
82.00	83.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.96	44.90	0.54	
83.00	84.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	37.69	36.62	1.11	
84.00	85.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	36.41	39.58	0.78	
85.00	86.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	37.21	40.42	0.51	

ANNEXURE-IIIB/7

BOREHOLE NO:MKDR-2

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
86.00	87.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.53	45.35	0.44	
87.00	88.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	34.26	41.72	0.51	
88.00	89.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	34.62	45.97	0.41	
89.00	90.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.93	40.37	0.36	

ANNEXURE-IIIB/8

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-4

LATITUDE : 1678054.568
LONGITUDE : 653562.026
REDUCED LEVEL (M): 891.461

DATE OF COMMENCEMENT : 05/02/16
DATE OF CLOSURE : 05/02/16
DEPTH DRILLED (M) : 61.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	SOFT LAMINATED ORE	DARK GREY	50.29	18.64	4.56	
1.00	2.00	1.00	SOFT LAMINATED ORE	DARK GREY	44.47	30.43	2.75	
2.00	3.00	1.00	SOFT LAMINATED ORE	LIGHT GREY	44.45	32.76	1.24	
3.00	4.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT GREY	39.86	37.22	0.70	
4.00	5.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT GREY	41.92	36.14	0.61	
5.00	6.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT GREY	42.48	34.35	1.47	
6.00	7.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT GREY	40.27	36.99	0.75	
7.00	8.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT GREY	36.39	42.12	0.74	
8.00	9.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	41.00	35.02	0.54	
9.00	10.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	42.48	31.71	3.32	
10.00	11.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	34.54	45.48	1.28	
11.00	12.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	39.81	36.77	1.14	
12.00	13.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	40.43	36.23	1.19	
13.00	14.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	40.10	36.36	1.84	
14.00	15.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	41.81	33.62	1.84	
15.00	16.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	42.66	32.66	2.57	
16.00	17.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	41.99	34.75	1.16	
17.00	18.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	41.81	35.37	1.77	
18.00	19.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	42.29	33.94	1.58	
19.00	20.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	47.27	26.79	5.30	
20.00	21.00	1.00	ALTERED BHQ	LIGHT BROWN	48.12	27.10	3.35	
21.00	22.00	1.00	ALTERED BHQ	LIGHT BROWN	47.82	26.52	3.12	
22.00	23.00	1.00	ALTERED BHQ	LIGHT BROWN	44.41	30.95	1.82	
23.00	24.00	1.00	ALTERED BHQ	LIGHT BROWN	42.70	31.03	2.24	

ANNEXURE-IIIB/9

BOREHOLE NO:MKDR-4

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	ALTERED BHQ	LIGHT BROWN	43.26	33.01	1.03	
25.00	26.00	1.00	ALTERED BHQ	LIGHT BROWN	39.30	38.79	0.97	
26.00	27.00	1.00	ALTERED BHQ	LIGHT BROWN	35.75	38.82	0.89	
27.00	28.00	1.00	ALTERED BHQ	LIGHT BROWN	39.05	35.09	1.02	
28.00	29.00	1.00	ALTERED BHQ	LIGHT BROWN	39.70	35.04	0.64	
29.00	30.00	1.00	ALTERED BHQ	LIGHT BROWN	38.17	38.38	0.73	
30.00	31.00	1.00	ALTERED BHQ	LIGHT BROWN	40.92	35.70	0.74	
31.00	32.00	1.00	ALTERED BHQ	LIGHT BROWN	39.22	35.97	0.73	
32.00	33.00	1.00	ALTERED BHQ	LIGHT BROWN	41.43	33.94	0.93	
33.00	34.00	1.00	ALTERED BHQ	LIGHT BROWN	43.82	30.53	1.19	
34.00	35.00	1.00	ALTERED BHQ	LIGHT BROWN	40.26	36.47	0.62	
35.00	36.00	1.00	ALTERED BHQ	LIGHT BROWN	42.79	32.91	0.58	
36.00	37.00	1.00	ALTERED BHQ	LIGHT BROWN	37.59	37.31	0.85	
37.00	38.00	1.00	ALTERED BHQ	LIGHT BROWN	33.16	44.42	1.03	
38.00	39.00	1.00	ALTERED BHQ	LIGHT BROWN	34.96	43.95	1.21	
39.00	40.00	1.00	ALTERED BHQ	LIGHT BROWN	33.21	45.84	1.27	
40.00	41.00	1.00	ALTERED BHQ	LIGHT BROWN	35.35	41.78	0.98	
41.00	42.00	1.00	ALTERED BHQ	LIGHT BROWN	35.46	41.56	1.00	
42.00	43.00	1.00	ALTERED BHQ	LIGHT BROWN	37.69	40.29	1.03	
43.00	44.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	39.69	39.05	0.54	
44.00	45.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	37.80	39.98	0.79	
45.00	46.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	36.45	42.09	0.58	
46.00	47.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	43.70	35.58	0.78	
47.00	48.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	45.76	33.11	1.11	
48.00	49.00	1.00	SILICEOUS POWDER+ORE PIECES	LIGHT BROWN	36.98	33.05	3.67	
49.00	50.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	14.40	74.90	1.53	
50.00	51.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	9.51	85.56	0.76	
51.00	52.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	23.75	35.22	19.38	
52.00	53.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	9.82	46.41	24.54	
53.00	54.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	20.06	44.03	14.13	
54.00	55.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	25.46	42.82	9.53	

ANNEXURE-IIIB/10

BOREHOLE NO:MKDR-4

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	21.33	58.78	3.99	
56.00	57.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	18.93	65.25	3.76	
57.00	58.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	12.06	71.94	5.62	
58.00	59.00	1.00	SHALE	LIGHT BROWN	6.81	71.54	10.84	
59.00	60.00	1.00	SHALE	LIGHT BROWN	6.28	69.94	11.32	
60.00	61.00	1.00	SHALE	LIGHT BROWN	13.80	59.24	11.34	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-5

LATITUDE : 1677733.610
LONGITUDE : 653952.350
REDUCED LEVEL (M): 875.130

DATE OF COMMENCEMENT : 05/02/16
DATE OF CLOSURE : 07/02/16
DEPTH DRILLED (M) : 95.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	POWDERY ORE	STEEL GREY	65.62	3.65	2.42	
1.00	2.00	1.00	POWDERY ORE	STEEL GREY	65.81	3.31	2.55	
2.00	3.00	1.00	POWDERY ORE	STEEL GREY	64.88	3.98	2.84	
3.00	4.00	1.00	SOFT LAMINATED ORE	LIGHT GREY	38.28	41.17	0.96	
4.00	5.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.29	23.46	23.35	OCC.CLAYEY
5.00	6.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	44.38	18.70	17.36	OCC.CLAYEY
6.00	7.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.45	30.74	7.71	ALTERING TO MARTITE ?,FRIABLE
7.00	8.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.34	31.94	5.29	ALTERING TO MARTITE ?,FRIABLE
8.00	9.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.27	36.35	2.25	ALTERING TO MARTITE ?,FRIABLE
9.00	10.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.09	35.79	2.13	ALTERING TO MARTITE ?,FRIABLE
10.00	11.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.36	36.57	2.41	ALTERING TO MARTITE ?,FRIABLE
11.00	12.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.57	37.86	2.38	ALTERING TO MARTITE ?,FRIABLE
12.00	13.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.42	44.86	0.83	ALTERING TO MARTITE ?,FRIABLE
13.00	14.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.81	44.23	0.95	ALTERING TO MARTITE ?,FRIABLE
14.00	15.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.19	44.94	1.17	ALTERING TO MARTITE ?,FRIABLE
15.00	16.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.71	41.17	2.10	ALTERING TO MARTITE ?,FRIABLE
16.00	17.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.17	44.76	1.29	ALTERING TO MARTITE ?,FRIABLE
17.00	18.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.27	36.80	1.87	ALTERING TO MARTITE ?,FRIABLE
18.00	19.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.92	37.76	1.79	ALTERING TO MARTITE ?,FRIABLE
19.00	20.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.71	39.14	1.53	ALTERING TO MARTITE ?,FRIABLE
20.00	21.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.82	35.87	2.05	ALTERING TO MARTITE ?,FRIABLE
21.00	22.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.44	43.42	1.84	ALTERING TO MARTITE ?,FRIABLE
22.00	23.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.49	37.43	1.75	ALTERING TO MARTITE ?,FRIABLE
23.00	24.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.79	38.11	1.58	ALTERING TO MARTITE ?,FRIABLE

ANNEXURE-IIIB/12

BOREHOLE NO:MKDR-5

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.90	43.63	1.30	ALTERING TO MARTITE ?,FRIABLE
25.00	26.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	31.49	52.66	1.56	
26.00	27.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	29.56	55.92	0.97	
27.00	28.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	28.48	56.68	1.39	
28.00	29.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.27	51.69	1.48	
29.00	30.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.58	49.13	1.28	
30.00	31.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.84	47.46	1.16	
31.00	32.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.20	42.42	1.29	
32.00	33.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.74	43.52	0.83	
33.00	34.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.28	42.59	0.69	
34.00	35.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.27	45.79	0.51	
35.00	36.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.80	50.03	0.50	
36.00	37.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.15	50.09	0.54	
37.00	38.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.31	51.08	0.53	
38.00	39.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.28	51.40	0.46	
39.00	40.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.55	52.60	0.41	
40.00	41.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.97	52.22	0.44	
41.00	42.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.09	51.87	0.74	
42.00	43.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.21	42.52	1.00	
43.00	44.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.60	46.00	1.26	
44.00	45.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.82	52.07	0.59	
45.00	46.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.66	49.52	0.69	
46.00	47.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.02	50.00	1.29	
47.00	48.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.14	50.04	0.96	
48.00	49.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.09	47.08	1.15	
49.00	50.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.94	44.16	0.88	
50.00	51.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	28.81	56.88	0.54	
51.00	52.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	28.82	56.67	0.72	
52.00	53.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	30.44	53.94	0.83	
53.00	54.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.22	41.25	0.81	
54.00	55.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	44.42	30.96	1.23	

ANNEXURE-IIIB/13

BOREHOLE NO:MKDR-5

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.90	33.22	0.97	
56.00	57.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	42.26	32.80	1.00	
57.00	58.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	42.59	32.30	0.95	
58.00	59.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.63	33.33	0.78	
59.00	60.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.15	37.62	0.76	
60.00	61.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.26	34.62	1.09	
61.00	62.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.80	37.63	0.92	
62.00	63.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.75	37.23	0.96	
63.00	64.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.08	38.47	0.85	
64.00	65.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	46.02	29.75	1.36	
65.00	66.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	49.04	26.80	1.61	
66.00	67.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.55	44.96	0.88	
67.00	68.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.12	42.46	0.63	
68.00	69.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.78	34.45	0.75	
69.00	70.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.66	43.55	0.49	
70.00	71.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.34	42.69	0.52	
71.00	72.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.33	44.14	0.76	
72.00	73.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.68	51.53	0.68	
73.00	74.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.27	45.93	0.94	
74.00	75.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	45.41	32.61	1.15	
75.00	76.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.23	48.53	0.53	
76.00	77.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.08	48.56	0.45	
77.00	78.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.83	42.57	0.46	
78.00	79.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.70	43.14	0.63	
79.00	80.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.36	49.09	0.56	
80.00	81.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.50	48.07	0.73	
81.00	82.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	36.22	47.05	1.03	
82.00	83.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	33.04	49.06	1.41	
83.00	84.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.85	50.29	0.97	
84.00	85.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.70	43.41	1.01	
85.00	86.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.97	50.70	0.46	

BOREHOLE NO:MKDR-5

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
86.00	87.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	45.11	33.32	0.94	
87.00	88.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	52.37	12.19	11.85	HAEMATITE PIECES
88.00	89.00	1.00	SHALY ORE	LIGHT GREY	38.74	32.02	6.11	HAEMATITE PIECES
89.00	90.00	1.00	SHALY ORE	LIGHT GREY	43.85	21.44	12.12	
90.00	91.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.07	42.80	0.93	
91.00	92.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	40.39	38.67	1.34	
92.00	93.00	1.00	BHQ	DARK GREY	31.39	53.29	0.89	
93.00	94.00	1.00	BHQ	DARK GREY	32.84	49.50	0.83	
94.00	95.00	1.00	BHQ	DARK GREY	34.19	48.55	0.91	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-6

LATITUDE : 1678108.620 — **DATE OF COMMENCEMENT : 05/02/16**
LONGITUDE : 653473.335 — **DATE OF CLOSURE : 06/02/16**
REDUCED LEVEL (M): 884.320 — **DEPTH DRILLED (M) : 43.00**

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	SILICEOUS IRON ORE	DARK BROWN	39.69	26.12	15.29	SAMPLE DEPTH :0.00-3.00m
1.00	2.00	1.00	SILICEOUS IRON ORE	DARK BROWN				
2.00	3.00	1.00	SILICEOUS IRON ORE	DARK BROWN				
3.00	4.00	1.00	SILICEOUS IRON ORE	DARK BROWN	39.15	24.06	14.98	SAMPLE DEPTH : 3.00-6.00m
4.00	5.00	1.00	SILICEOUS IRON ORE	DARK BROWN				
5.00	6.00	1.00	SILICEOUS IRON ORE	DARK BROWN				
6.00	7.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.53	21.58	15.91	SAMPLE DEPTH : 6.00-11.00m
7.00	8.00	1.00	SILICEOUS IRON ORE	DARK BROWN				
8.00	9.00	1.00	SILICEOUS IRON ORE	DARK BROWN				
9.00	10.00	1.00	SILICEOUS IRON ORE	DARK BROWN	40.71	20.86	15.07	
10.00	11.00	1.00	SILICEOUS IRON ORE	DARK BROWN				
11.00	12.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	39.66	19.05	17.95	SAMPLE DEPTH : 11.00-14.00m
12.00	13.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
13.00	14.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
14.00	15.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	41.54	17.80	16.61	SAMPLE DEPTH : 14.00-17.00m
15.00	16.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
16.00	17.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
17.00	18.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	32.04	21.93	22.22	SAMPLE DEPTH : 17.00-20.00m
18.00	19.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
19.00	20.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
20.00	21.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	35.61	22.37	20.48	SAMPLE DEPTH : 20.00-23.00m
21.00	22.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
22.00	23.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
23.00	24.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	37.17	24.48	17.65	SAMPLE DEPTH : 23.00-26.00m

ANNEXURE-IIIB/16

BOREHOLE NO:MKDR-6

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
25.00	26.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
26.00	27.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	32.20	27.83	14.92	SAMPLE DEPTH : 26.00-27.00m
27.00	28.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	31.80	27.53	16.77	SAMPLE DEPTH : 27.00-29.00m
28.00	29.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
29.00	30.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	35.18	28.82	11.80	SAMPLE DEPTH : 29.00-31.00m
30.00	31.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN				
31.00	32.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	22.31	43.43	17.57	SAMPLE DEPTH : 31.00-33.00m
32.00	33.00	1.00	ALTERED BHQ	PINKISH BROWN				
33.00	34.00	1.00	ALTERED BHQ	YELLOWISH WHITE	29.35	42.67	9.95	SAMPLE DEPTH : 33.00-35.00m
34.00	35.00	1.00	ALTERED BHQ	YELLOWISH WHITE				
35.00	36.00	1.00	ALTERED BHQ	YELLOWISH WHITE	18.64	54.00	11.05	SAMPLE DEPTH : 35.00-38.00m
36.00	37.00	1.00	ALTERED BHQ	YELLOWISH WHITE				
37.00	38.00	1.00	ALTERED BHQ	YELLOWISH WHITE				
38.00	39.00	1.00	ALTERED BHQ	YELLOWISH WHITE	14.61	65.55	7.05	SAMPLE DEPTH : 38.00-41.00m
39.00	40.00	1.00	ALTERED BHQ	YELLOWISH WHITE				
40.00	41.00	1.00	ALTERED BHQ	YELLOWISH WHITE				SAMPLE DEPTH : 41.00-43.00m
41.00	42.00	1.00	ALTERED BHQ	YELLOWISH WHITE	8.19	68.75	10.32	
42.00	43.00	1.00	ALTERED BHQ	YELLOWISH WHITE				

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-7

LATITUDE : 1678254.230
LONGITUDE : 653461.634
REDUCED LEVEL (M): 867.555
DATE OF COMMENCEMENT : 06/02/16
DATE OF CLOSURE : 06/02/16
DEPTH DRILLED (M) : 49.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.61	38.98	3.49	LAMINATED,SOFT
1.00	2.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.59	33.51	3.26	LAMINATED,SOFT
2.00	3.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.23	35.20	2.70	LAMINATED,SOFT,POWDERY
3.00	4.00	1.00	SHALY ORE	LIGHT GREY	47.44	28.47	3.16	SILICEOUS
4.00	5.00	1.00	SHALY ORE	LIGHT GREY	48.00	27.62	3.18	SILICEOUS
5.00	6.00	1.00	SHALY ORE	LIGHT GREY	48.06	27.40	3.29	SILICEOUS
6.00	7.00	1.00	SHALY ORE	LIGHT GREY	46.53	29.26	3.15	SILICEOUS
7.00	8.00	1.00	SHALY ORE	LIGHT GREY	50.29	24.06	3.80	SILICEOUS
8.00	9.00	1.00	SHALY ORE	LIGHT GREY	51.43	22.91	3.33	SILICEOUS
9.00	10.00	1.00	SHALY ORE	LIGHT GREY	49.14	25.80	2.26	SILICEOUS
10.00	11.00	1.00	SHALY ORE	LIGHT GREY	38.15	36.88	1.42	
11.00	12.00	1.00	SHALY ORE	LIGHT GREY	38.16	37.60	1.33	
12.00	13.00	1.00	SHALY ORE	LIGHT GREY	39.88	35.21	1.13	
13.00	14.00	1.00	SHALY ORE	LIGHT GREY	39.92	35.06	1.16	
14.00	15.00	1.00	SOFT LAMINATED ORE	DARK GREY	49.20	24.93	0.91	
15.00	16.00	1.00	SOFT LAMINATED ORE	DARK GREY	57.44	10.50	6.54	
16.00	17.00	1.00	SOFT LAMINATED ORE	DARK GREY	60.20	9.52	3.27	
17.00	18.00	1.00	SOFT LAMINATED ORE	DARK GREY	57.70	11.73	5.53	
18.00	19.00	1.00	SOFT LAMINATED ORE	DARK GREY	46.20	16.15	17.07	
19.00	20.00	1.00	SOFT LAMINATED ORE	DARK GREY	43.50	17.37	19.59	
20.00	21.00	1.00	SOFT LAMINATED ORE	STEEL GREY	58.60	8.60	7.34	
21.00	22.00	1.00	SOFT LAMINATED ORE	STEEL GREY	64.05	5.06	2.42	
22.00	23.00	1.00	SOFT LAMINATED ORE	STEEL GREY	63.34	5.27	3.83	
23.00	24.00	1.00	SOFT LAMINATED ORE	STEEL GREY	48.72	13.83	13.30	

BOREHOLE NO:MKDR-7

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	SHALE	STEEL GREY	10.55	36.02	30.44	
25.00	26.00	1.00	SHALY ORE	STEEL GREY	56.51	9.91	9.22	
26.00	27.00	1.00	SHALY ORE	STEEL GREY	60.42	8.35	5.19	
27.00	28.00	1.00	POWDERY ORE	STEEL GREY	51.30	23.37	3.11	
28.00	29.00	1.00	POWDERY ORE	STEEL GREY	44.93	30.10	2.81	
29.00	30.00	1.00	POWDERY ORE	STEEL GREY	39.53	32.29	5.27	
30.00	31.00	1.00	POWDERY ORE	LIGHT GREY	47.00	27.92	2.17	
31.00	32.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	34.48	41.52	1.75	
32.00	33.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.04	35.50	4.96	
33.00	34.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	30.02	50.31	1.77	
34.00	35.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.02	47.99	1.83	
35.00	36.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	33.83	44.28	2.05	
36.00	37.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	34.08	43.82	3.00	
37.00	38.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	31.77	47.57	2.17	
38.00	39.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.14	43.69	5.75	
39.00	40.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.11	43.76	5.31	
40.00	41.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	30.64	52.13	1.81	
41.00	42.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	31.54	51.32	1.85	
42.00	43.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	29.36	54.58	1.86	
43.00	44.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	32.71	51.55	1.11	
44.00	45.00	1.00	FERRUGINOUS SHALE	LIGHT GREY	26.24	39.64	14.78	
45.00	46.00	1.00	FERRUGINOUS SHALE	LIGHT GREY	28.63	39.53	12.27	
46.00	47.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	35.04	45.77	2.76	
47.00	48.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	35.86	43.79	1.44	
48.00	49.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.99	37.14	1.47	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-8

LATITUDE : 1678299.200
LONGITUDE : 653425.818
REDUCED LEVEL (M): 877.043

DATE OF COMMENCEMENT : 06/02/16
DATE OF CLOSURE : 07/02/16
DEPTH DRILLED (M) : 85.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	SHALY ORE	DARK BROWN	50.84	12.55	10.71	
1.00	2.00	1.00	SHALY ORE	DARK BROWN	57.83	8.38	7.95	
2.00	3.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	26.51	28.08	24.35	
3.00	4.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	24.76	28.40	23.58	
4.00	5.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	23.58	29.00	24.80	
5.00	6.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	27.37	27.04	23.38	
6.00	7.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	26.89	27.11	23.38	
7.00	8.00	1.00	FERRUGINOUS SHALE	PINKISH BROWN	37.84	22.92	22.29	
8.00	9.00	1.00	POWDERY ORE	PINKISH BROWN	63.00	5.18	4.63	OCC.HAEMATTIE PIECES
9.00	10.00	1.00	POWDERY ORE	DARK GREY	63.40	4.92	4.34	OCC.HAEMATTIE PIECES
10.00	11.00	1.00	HAEMATITIC ORE	DARK GREY	63.67	4.11	3.69	
11.00	12.00	1.00	MANGANIFER.LAT.ORE	DARK BROWN	55.49	8.50	8.16	OCC.CLAYEY
12.00	13.00	1.00	MANGANIFER.LAT.ORE	DARK BROWN	53.09	9.74	8.38	OCC.CLAYEY
13.00	14.00	1.00	MANGANIFER.LAT.ORE	DARK BROWN	57.17	7.40	6.87	OCC.CLAYEY
14.00	15.00	1.00	MANGANIFER.LAT.ORE	DARK BROWN	55.97	8.47	7.55	OCC.CLAYEY
15.00	16.00	1.00	CLAYEY IRON ORE	YELLOW	41.26	16.16	14.41	
16.00	17.00	1.00	FERRUGINOUS CLAY	YELLOW	29.93	25.49	23.20	
17.00	18.00	1.00	SHALY ORE	DARK GREY	52.11	12.12	11.87	
18.00	19.00	1.00	HAEMATITIC ORE	DARK GREY	65.68	2.71	1.82	
19.00	20.00	1.00	HAEMATITIC ORE	DARK GREY	58.32	8.17	8.24	
20.00	21.00	1.00	HAEMATITIC ORE	STEEL GREY	58.42	7.82	8.35	
21.00	22.00	1.00	HAEMATITIC ORE	STEEL GREY	66.00	2.76	1.71	
22.00	23.00	1.00	HAEMATITIC ORE	STEEL GREY	56.64	8.99	9.80	
23.00	24.00	1.00	HAEMATITIC ORE	STEEL GREY	56.57	9.28	9.01	

BOREHOLE NO:MKDR-8

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	HAEMATITIC ORE	STEEL GREY	65.44	3.40	1.45	
25.00	26.00	1.00	HAEMATITIC ORE	STEEL GREY	65.23	3.56	1.34	
26.00	27.00	1.00	HAEMATITIC ORE	STEEL GREY	64.87	4.03	1.93	
27.00	28.00	1.00	HAEMATITIC ORE	STEEL GREY	64.13	5.23	2.37	
28.00	29.00	1.00	POWDERY ORE	STEEL GREY	61.19	8.20	1.55	
29.00	30.00	1.00	POWDERY ORE	STEEL GREY	56.97	13.12	1.94	
30.00	31.00	1.00	POWDERY ORE	STEEL GREY	60.10	9.64	1.60	
31.00	32.00	1.00	POWDERY ORE	STEEL GREY	51.99	22.88	1.23	
32.00	33.00	1.00	POWDERY ORE	STEEL GREY	54.05	18.77	2.44	
33.00	34.00	1.00	SHALY ORE	DARK GREY	41.60	26.66	10.18	
34.00	35.00	1.00	HAEMATITIC ORE	LIGHT BROWN	54.84	17.85	2.39	
35.00	36.00	1.00	POWDERY ORE	LIGHT BROWN	53.86	17.99	2.53	
36.00	37.00	1.00	HAEMATITIC ORE	LIGHT BROWN	39.58	32.87	7.78	
37.00	38.00	1.00	HAEMATITIC ORE	LIGHT BROWN	54.96	16.59	2.57	
38.00	39.00	1.00	HAEMATITIC ORE	LIGHT BROWN	40.15	34.63	6.76	
39.00	40.00	1.00	HAEMATITIC ORE	LIGHT BROWN	35.44	41.27	2.64	
40.00	41.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	45.46	28.66	3.18	
41.00	42.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.52	38.93	1.94	
42.00	43.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	39.79	35.29	2.21	
43.00	44.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	35.88	41.85	1.40	
44.00	45.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	36.55	41.70	1.99	
45.00	46.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	35.96	41.62	1.73	
46.00	47.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	36.95	42.88	1.10	
47.00	48.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	39.50	36.46	3.36	
48.00	49.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	38.51	42.97	0.95	
49.00	50.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	39.30	38.27	3.95	
50.00	51.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	33.29	47.72	1.53	
51.00	52.00	1.00	SILICEOUS IRON ORE	LIGHT GREY	41.56	38.52	1.60	
52.00	53.00	1.00	SILICEOUS IRON ORE	DARK BROWN	36.20	44.04	2.03	
53.00	54.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.31	36.82	4.44	
54.00	55.00	1.00	SILICEOUS IRON ORE	DARK BROWN	36.59	37.69	4.67	

BOREHOLE NO:MKDR-8

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	SILICEOUS IRON ORE	DARK BROWN	39.63	39.34	1.12	
56.00	57.00	1.00	SILICEOUS IRON ORE	DARK BROWN	37.73	41.78	1.01	
57.00	58.00	1.00	SILICEOUS IRON ORE	DARK BROWN	39.33	38.53	1.60	
58.00	59.00	1.00	SILICEOUS IRON ORE	DARK BROWN	34.27	44.77	1.25	
59.00	60.00	1.00	SILICEOUS IRON ORE	DARK BROWN	33.56	43.87	3.01	
60.00	61.00	1.00	SILICEOUS IRON ORE	DARK BROWN	28.64	54.85	1.24	
61.00	62.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	39.97	35.91	2.32	
62.00	63.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	35.83	24.44	15.82	
63.00	64.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	40.24	21.90	13.27	
64.00	65.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	21.91	32.01	18.92	
65.00	66.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	20.18	33.73	17.45	
66.00	67.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	12.80	39.20	15.97	
67.00	68.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	11.92	54.29	11.64	
68.00	69.00	1.00	SILICEOUS IRON ORE	DARK BROWN	37.05	34.04	5.53	
69.00	70.00	1.00	SILICEOUS IRON ORE	DARK BROWN	34.59	42.35	2.60	
70.00	71.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.41	45.91	2.01	
71.00	72.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.61	36.56	1.92	
72.00	73.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.97	46.39	1.16	
73.00	74.00	1.00	SILICEOUS IRON ORE	DARK GREY	43.22	33.40	1.13	
74.00	75.00	1.00	SILICEOUS IRON ORE	DARK GREY	43.39	32.74	1.76	
75.00	76.00	1.00	SILICEOUS IRON ORE	DARK GREY	39.27	37.23	1.55	
76.00	77.00	1.00	SILICEOUS IRON ORE	DARK GREY	41.98	35.41	1.47	
77.00	78.00	1.00	SILICEOUS IRON ORE	DARK GREY	39.94	37.67	1.09	
78.00	79.00	1.00	SILICEOUS IRON ORE	DARK GREY	40.74	36.42	1.04	
79.00	80.00	1.00	SILICEOUS IRON ORE	DARK GREY	39.92	37.44	1.34	
80.00	81.00	1.00	SILICEOUS IRON ORE	DARK GREY	38.08	40.37	1.23	
81.00	82.00	1.00	SILICEOUS IRON ORE	DARK GREY	41.14	35.60	1.58	
82.00	83.00	1.00	SILICEOUS IRON ORE	DARK GREY	39.98	38.08	1.54	
83.00	84.00	1.00	SILICEOUS IRON ORE	DARK GREY	35.79	42.40	1.77	
84.00	85.00	1.00	SILICEOUS IRON ORE	DARK GREY	37.98	36.21	4.03	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-9

LATITUDE : 1677750.922
LONGITUDE : 653829.943
REDUCED LEVEL (M): 874.993

DATE OF COMMENCEMENT : 08/02/16
DATE OF CLOSURE : 08/02/16
DEPTH DRILLED (M) : 80.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	SILICEOUS IRON ORE	DARK BROWN	43.41	34.53	1.37	
1.00	2.00	1.00	SILICEOUS IRON ORE	DARK BROWN	43.79	34.11	1.37	
2.00	3.00	1.00	POWDERY ORE	STEEL GREY	49.53	25.14	1.71	
3.00	4.00	1.00	POWDERY ORE	STEEL GREY	51.55	23.25	2.07	
4.00	5.00	1.00	POWDERY ORE	DARK GREY	52.12	22.93	1.74	
5.00	6.00	1.00	POWDERY ORE	DARK GREY	48.76	25.66	1.59	
6.00	7.00	1.00	POWDERY ORE	DARK GREY	43.22	32.04	0.76	
7.00	8.00	1.00	POWDERY ORE	DARK GREY	39.77	35.37	0.73	
8.00	9.00	1.00	POWDERY ORE	DARK GREY	37.98	37.83	0.69	
9.00	10.00	1.00	POWDERY ORE	DARK GREY	45.36	29.32	1.29	
10.00	11.00	1.00	SILICEOUS IRON ORE	DARK BROWN	39.77	36.27	0.71	
11.00	12.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.15	36.66	0.81	
12.00	13.00	1.00	SILICEOUS IRON ORE	DARK BROWN	35.64	42.57	0.64	
13.00	14.00	1.00	SILICEOUS IRON ORE	DARK BROWN	35.80	42.36	0.63	
14.00	15.00	1.00	SILICEOUS IRON ORE	DARK BROWN	33.62	44.74	0.55	
15.00	16.00	1.00	SILICEOUS IRON ORE	DARK BROWN	33.70	44.92	0.66	
16.00	17.00	1.00	SILICEOUS IRON ORE	DARK BROWN	34.24	44.68	0.52	
17.00	18.00	1.00	BHQ	LIGHT BROWN	29.73	53.10	0.82	
18.00	19.00	1.00	BHQ	LIGHT BROWN	33.53	43.65	1.28	
19.00	20.00	1.00	BHQ	LIGHT BROWN	26.11	56.40	1.92	
20.00	21.00	1.00	BHQ	LIGHT BROWN	24.81	58.78	1.56	
21.00	22.00	1.00	BHQ	LIGHT BROWN	27.75	54.24	2.33	
22.00	23.00	1.00	BHQ	LIGHT BROWN	30.57	51.43	2.55	
23.00	24.00	1.00	BHQ	LIGHT BROWN	26.94	54.63	4.42	

ANNEXURE-IIIB/23

BOREHOLE NO:MKDR-9

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	BHQ	LIGHT BROWN	26.23	55.61	4.40	
25.00	26.00	1.00	BHQ	LIGHT BROWN	24.85	55.77	5.87	
26.00	27.00	1.00	BHQ	LIGHT BROWN	29.71	51.40	4.19	
27.00	28.00	1.00	BHQ	LIGHT BROWN	29.76	52.31	3.66	
28.00	29.00	1.00	BHQ	LIGHT BROWN	29.39	52.48	3.89	
29.00	30.00	1.00	BHQ	LIGHT BROWN	28.25	53.14	4.39	
30.00	31.00	1.00	BHQ	LIGHT BROWN	28.28	53.09	4.28	
31.00	32.00	1.00	SILICEOUS IRON ORE	YELLOWISH BROWN	31.23	50.03	3.96	
32.00	33.00	1.00	SILICEOUS IRON ORE	YELLOWISH BROWN	31.35	49.76	4.14	
33.00	34.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	31.69	48.32	2.98	
34.00	35.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	29.71	50.43	4.69	
35.00	36.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.33	51.15	1.66	
36.00	37.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	31.32	52.12	1.83	
37.00	38.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.93	49.54	1.50	
38.00	39.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.17	47.61	1.81	
39.00	40.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	31.85	52.78	0.79	
40.00	41.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.05	46.19	1.39	
41.00	42.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.38	46.41	1.73	
42.00	43.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.97	43.47	1.70	
43.00	44.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.84	50.84	1.00	
44.00	45.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.65	49.81	0.80	
45.00	46.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.09	48.69	0.69	
46.00	47.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	30.58	53.19	0.65	
47.00	48.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	31.29	52.50	1.13	
48.00	49.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.06	49.50	0.95	
49.00	50.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.79	43.79	3.25	
50.00	51.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	29.55	54.87	0.94	
51.00	52.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.10	37.24	3.18	
52.00	53.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.24	48.27	1.30	
53.00	54.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	31.70	49.84	1.50	
54.00	55.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.84	42.72	5.54	

BOREHOLE NO:MKDR-9

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	22.35	58.89	4.58	
56.00	57.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.73	44.76	4.53	
57.00	58.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.42	48.03	2.23	
58.00	59.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.56	46.92	1.30	
59.00	60.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.91	46.39	1.20	
60.00	61.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.62	45.16	1.57	
61.00	62.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.30	47.39	1.33	
62.00	63.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.61	49.00	2.21	
63.00	64.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.83	46.32	1.91	
64.00	65.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.52	45.83	1.75	
65.00	66.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.83	42.20	2.90	
66.00	67.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	32.58	49.71	1.51	
67.00	68.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.21	49.52	1.26	
68.00	69.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.27	48.56	2.34	
69.00	70.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.22	49.22	2.53	
70.00	71.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.58	48.00	3.04	
71.00	72.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.45	47.64	1.62	
72.00	73.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.10	48.35	1.31	
73.00	74.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.92	49.84	1.40	
74.00	75.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.62	48.83	1.25	
75.00	76.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.27	48.03	1.32	
76.00	77.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.66	47.55	1.10	
77.00	78.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.89	42.64	1.32	
78.00	79.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.39	49.24	1.26	
79.00	80.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.37	46.24	1.73	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-10

LATITUDE : 1677973.804
LONGITUDE : 653621.646
REDUCED LEVEL (M): 908.151

DATE OF COMMENCEMENT : 08/02/16
DATE OF CLOSURE : 09/02/16
DEPTH DRILLED (M) : 121.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	HAEMATITIC ORE	DARK BROWN	64.83	3.59	0.97	
1.00	2.00	1.00	HAEMATITIC ORE	DARK BROWN	51.11	21.37	1.60	
2.00	3.00	1.00	HAEMATITIC ORE	DARK BROWN	52.40	11.13	10.34	
3.00	4.00	1.00	HAEMATITIC ORE	DARK BROWN	33.60	44.56	2.52	
4.00	5.00	1.00	HAEMATITIC ORE	DARK BROWN	58.05	6.69	8.44	
5.00	6.00	1.00	HAEMATITIC ORE	DARK BROWN	63.78	4.48	2.83	
6.00	7.00	1.00	HAEMATITIC ORE	DARK BROWN	65.20	3.67	2.33	
7.00	8.00	1.00	HAEMATITIC ORE	STEEL GREY	55.45	10.32	9.47	
8.00	9.00	1.00	HAEMATITIC ORE	STEEL GREY	62.32	5.72	5.07	
9.00	10.00	1.00	POWDERY ORE	STEEL GREY	63.88	4.41	4.09	OCC.MATALLIC GREY
10.00	11.00	1.00	POWDERY ORE	STEEL GREY	62.08	5.14	6.01	OCC.MATALLIC GREY
11.00	12.00	1.00	POWDERY ORE	STEEL GREY	62.55	5.35	5.13	OCC.MATALLIC GREY
12.00	13.00	1.00	POWDERY ORE	STEEL GREY	62.01	5.55	5.69	OCC.MATALLIC GREY
13.00	14.00	1.00	POWDERY ORE	STEEL GREY	50.34	23.86	1.32	
14.00	15.00	1.00	POWDERY ORE	STEEL GREY	66.26	3.02	1.04	
15.00	16.00	1.00	POWDERY ORE	STEEL GREY	67.30	1.99	1.03	
16.00	17.00	1.00	POWDERY ORE	STEEL GREY	63.64	5.87	0.74	
17.00	18.00	1.00	POWDERY ORE	STEEL GREY	63.44	5.66	1.68	
18.00	19.00	1.00	POWDERY ORE	STEEL GREY	61.45	7.02	3.17	
19.00	20.00	1.00	POWDERY ORE	STEEL GREY	57.21	10.86	6.63	
20.00	21.00	1.00	POWDERY ORE	STEEL GREY	57.29	11.29	5.14	
21.00	22.00	1.00	POWDERY ORE	STEEL GREY	58.65	11.14	4.65	
22.00	23.00	1.00	POWDERY ORE	STEEL GREY	52.16	20.47	4.82	
23.00	24.00	1.00	POWDERY ORE	STEEL GREY	54.49	16.98	3.88	

BOREHOLE NO:MKDR-10

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	POWDERY ORE	STEEL GREY	57.12	13.67	3.52	
25.00	26.00	1.00	POWDERY ORE	STEEL GREY	60.71	6.67	6.49	
26.00	27.00	1.00	POWDERY ORE	STEEL GREY	55.42	10.55	9.52	
27.00	28.00	1.00	POWDERY ORE	STEEL GREY	55.37	10.48	10.23	
28.00	29.00	1.00	POWDERY ORE	DARK GREY	58.07	8.10	8.64	
29.00	30.00	1.00	POWDERY ORE	DARK GREY	58.08	7.83	9.01	
30.00	31.00	1.00	POWDERY ORE	DARK GREY	58.94	7.56	7.89	
31.00	32.00	1.00	POWDERY ORE	DARK GREY	58.86	7.89	7.37	
32.00	33.00	1.00	POWDERY ORE	DARK GREY	58.58	8.01	8.18	
33.00	34.00	1.00	POWDERY ORE	DARK GREY	62.23	6.87	4.02	
34.00	35.00	1.00	POWDERY ORE	DARK GREY	61.58	6.66	4.82	
35.00	36.00	1.00	POWDERY ORE	DARK GREY	63.28	6.00	1.46	
36.00	37.00	1.00	POWDERY ORE	DARK GREY	62.59	6.93	2.00	
37.00	38.00	1.00	POWDERY ORE	DARK GREY	61.40	8.53	2.08	
38.00	39.00	1.00	POWDERY ORE	DARK GREY	59.62	8.72	4.64	
39.00	40.00	1.00	POWDERY ORE	DARK GREY	56.22	11.87	5.46	
40.00	41.00	1.00	POWDERY ORE	DARK GREY	61.80	6.86	3.00	
41.00	42.00	1.00	POWDERY ORE	DARK GREY	55.72	16.32	1.18	
42.00	43.00	1.00	POWDERY ORE	STEEL GREY	52.26	19.76	1.72	
43.00	44.00	1.00	POWDERY ORE	STEEL GREY	51.64	23.12	1.36	
44.00	45.00	1.00	POWDERY ORE	STEEL GREY	31.71	51.69	1.24	
45.00	46.00	1.00	POWDERY ORE	STEEL GREY	60.57	6.22	5.23	
46.00	47.00	1.00	POWDERY ORE	STEEL GREY	48.81	24.30	1.28	
47.00	48.00	1.00	POWDERY ORE	STEEL GREY	50.83	21.53	1.70	
48.00	49.00	1.00	POWDERY ORE	STEEL GREY	52.05	22.50	0.82	
49.00	50.00	1.00	HAEMATITIC ORE	STEEL GREY	54.32	17.55	1.55	
50.00	51.00	1.00	HAEMATITIC ORE	STEEL GREY	67.14	1.88	0.74	
51.00	52.00	1.00	HAEMATITIC ORE	STEEL GREY	47.00	26.60	0.85	
52.00	53.00	1.00	HAEMATITIC ORE	STEEL GREY	47.09	25.13	0.75	
53.00	54.00	1.00	HAEMATITIC ORE	STEEL GREY	50.85	22.89	1.55	
54.00	55.00	1.00	HAEMATITIC ORE	STEEL GREY	40.90	31.12	1.17	

BOREHOLE NO:MKDR-10

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	HAEMATITIC ORE	STEEL GREY	41.38	30.68	0.95	
56.00	57.00	1.00	HAEMATITIC ORE	STEEL GREY	41.19	31.84	0.79	
57.00	58.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.15	35.66	0.80	MASSIVE
58.00	59.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.90	34.59	0.71	MASSIVE
59.00	60.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.00	37.48	0.63	MASSIVE
60.00	61.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.39	33.80	2.06	MASSIVE
61.00	62.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.04	40.44	2.08	MASSIVE
62.00	63.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.02	43.41	1.35	MASSIVE
63.00	64.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.04	40.85	1.57	MASSIVE
64.00	65.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.16	40.63	1.11	
65.00	66.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.22	49.69	0.84	
66.00	67.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.87	46.72	1.20	
67.00	68.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.08	44.36	1.05	
68.00	69.00	1.00	SILICEOUS IRON ORE	DARK BROWN	37.97	44.28	1.02	
69.00	70.00	1.00	ALTERED BHQ	LIGHT BROWN	32.98	49.87	1.07	
70.00	71.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	41.61	35.14	0.55	
71.00	72.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.09	50.62	0.74	
72.00	73.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	34.55	48.92	0.77	
73.00	74.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.14	43.21	0.80	
74.00	75.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.26	44.20	0.65	
75.00	76.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.12	46.87	0.69	
76.00	77.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.58	44.84	0.57	
77.00	78.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.00	44.27	0.63	
78.00	79.00	1.00	SILICEOUS IRON ORE	DARK BROWN	30.02	52.54	1.23	
79.00	80.00	1.00	SILICEOUS IRON ORE	DARK BROWN	33.82	49.70	0.81	
80.00	81.00	1.00	SILICEOUS IRON ORE	DARK BROWN	41.40	29.16	1.20	
81.00	82.00	1.00	SILICEOUS IRON ORE	DARK BROWN	33.40	49.95	0.90	
82.00	83.00	1.00	SILICEOUS IRON ORE	DARK BROWN	34.26	49.75	0.80	
83.00	84.00	1.00	SILICEOUS IRON ORE	DARK BROWN	22.03	62.51	1.12	
84.00	85.00	1.00	SILICEOUS IRON ORE	DARK BROWN	31.05	52.79	1.03	
85.00	86.00	1.00	SILICEOUS IRON ORE	DARK BROWN	35.55	47.61	0.61	

BOREHOLE NO:MKDR-10

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
86.00	87.00	1.00	SILICEOUS IRON ORE	DARK BROWN	32.02	51.04	0.92	
87.00	88.00	1.00	ALTERED BHQ	DARK BROWN	33.45	49.58	0.88	
88.00	89.00	1.00	ALTERED BHQ	DARK BROWN	35.24	48.66	0.67	
89.00	90.00	1.00	HAEMATITIC ORE	DARK BROWN	55.40	6.87	9.65	
90.00	91.00	1.00	SILICEOUS IRON ORE	DARK BROWN	36.41	46.22	1.24	
91.00	92.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.13	43.94	0.74	
92.00	93.00	1.00	ALTERED BHQ	LIGHT BROWN	32.92	50.77	0.68	
93.00	94.00	1.00	ALTERED BHQ	LIGHT BROWN	24.20	59.34	0.99	
94.00	95.00	1.00	ALTERED BHQ	LIGHT BROWN	29.11	53.78	1.56	
95.00	96.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.13	47.62	0.74	
96.00	97.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.47	45.21	1.00	
97.00	98.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.08	42.75	0.60	
98.00	99.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.06	43.20	0.86	
99.00	100.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.54	47.59	0.66	
100.00	101.00	1.00	ALTERED BHQ	LIGHT BROWN	27.20	57.03	0.74	
101.00	102.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.76	41.00	0.70	
102.00	103.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	40.38	41.06	0.71	
103.00	104.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	33.19	50.47	0.81	
104.00	105.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	36.81	46.12	0.79	
105.00	106.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	39.71	42.40	0.71	
106.00	107.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.31	48.20	0.77	
107.00	108.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.43	43.89	0.89	
108.00	109.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.41	44.19	0.70	
109.00	110.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.76	43.89	0.54	
110.00	111.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.35	43.66	0.63	
111.00	112.00	1.00	FERRUGINOUS SHALE	YELLOW	27.72	51.93	3.80	
112.00	113.00	1.00	FERRUGINOUS SHALE	YELLOW	27.93	54.88	1.02	
113.00	114.00	1.00	SILICEOUS IRON ORE	YELLOWISH BROWN	34.08	48.52	0.84	
114.00	115.00	1.00	SILICEOUS IRON ORE	YELLOWISH BROWN	36.94	46.08	0.77	
115.00	116.00	1.00	BHQ	YELLOWISH BROWN	28.83	55.03	0.70	
116.00	117.00	1.00	BHQ	YELLOWISH BROWN	26.96	56.47	1.55	

BOREHOLE NO:MKDR-10

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
117.00	118.00	1.00	BHQ	YELLOWISH BROWN	26.99	56.17	1.32	
118.00	119.00	1.00	BHQ	YELLOWISH BROWN	28.56	54.75	1.23	
119.00	120.00	1.00	BHQ	YELLOWISH BROWN	16.00	70.96	1.99	
120.00	121.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	29.79	52.82	1.44	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-11

LATITUDE : 1678023.604
LONGITUDE : 653694.518
REDUCED LEVEL (M): 865.492

DATE OF COMMENCEMENT : 09/02/16
DATE OF CLOSURE : 09/02/16
DEPTH DRILLED (M) : 51.00

DEPTH (M) FROM	TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	FERRUGINOUS SHALE	DARK BROWN	10.52	43.90	22.91	
1.00	2.00	1.00	FERRUGINOUS SHALE	DARK BROWN	12.10	48.77	18.71	
2.00	3.00	1.00	FERRUGINOUS SHALE	DARK BROWN	9.23	50.38	20.42	
3.00	4.00	1.00	FERRUGINOUS SHALE	DARK BROWN	12.07	49.29	18.47	
4.00	5.00	1.00	FERRUGINOUS CLAY	DARK BROWN	9.17	50.53	20.16	
5.00	6.00	1.00	FERRUGINOUS CLAY	DARK BROWN	8.96	50.17	20.66	
6.00	7.00	1.00	FERRUGINOUS CLAY	DARK BROWN	7.45	50.40	21.87	
7.00	8.00	1.00	FERRUGINOUS CLAY	DARK BROWN	11.01	49.40	19.11	
8.00	9.00	1.00	FERRUGINOUS SHALE	DARK BROWN	13.25	46.92	18.25	
9.00	10.00	1.00	FERRUGINOUS SHALE	DARK BROWN	10.57	47.55	20.80	
10.00	11.00	1.00	FERRUGINOUS SHALE	DARK BROWN	13.53	46.53	18.87	
11.00	12.00	1.00	CLAY	DARK BROWN	9.96	50.40	19.96	
12.00	13.00	1.00	CLAY	DARK BROWN	8.33	50.67	20.79	
13.00	14.00	1.00	CLAY	DARK BROWN	8.63	50.32	21.09	
14.00	15.00	1.00	CLAY	DARK BROWN	7.25	51.57	21.00	
15.00	16.00	1.00	CLAY	DARK BROWN	8.71	50.90	20.24	
16.00	17.00	1.00	CLAY	DARK BROWN	7.65	51.46	20.80	
17.00	18.00	1.00	CLAY	DARK BROWN	9.61	49.95	20.34	
18.00	19.00	1.00	CLAY	DARK BROWN	10.50	48.93	20.06	
19.00	20.00	1.00	CLAY	DARK BROWN	9.77	52.96	17.68	
20.00	21.00	1.00	CLAY	DARK BROWN	11.36	50.22	18.46	
21.00	22.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	14.91	48.22	17.15	
22.00	23.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	14.48	49.14	16.31	
23.00	24.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	7.45	53.78	18.33	

BOREHOLE NO:MKDR-11

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	CLAY	YELLOWISH BROWN	3.78	55.32	20.67	
25.00	26.00	1.00	CLAY	YELLOWISH BROWN	3.32	55.09	19.79	
26.00	27.00	1.00	CLAY	YELLOWISH BROWN	7.33	52.70	18.87	
27.00	28.00	1.00	CLAY	YELLOWISH BROWN	7.29	54.34	17.59	
28.00	29.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	11.55	45.54	18.27	
29.00	30.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	9.77	51.45	17.53	
30.00	31.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	17.68	39.79	14.10	
31.00	32.00	1.00	CLAY	LIGHT BROWN	6.52	52.93	19.59	
32.00	33.00	1.00	CLAY	LIGHT BROWN	5.48	53.91	19.50	
33.00	34.00	1.00	CLAY	LIGHT BROWN	6.68	53.30	18.93	
34.00	35.00	1.00	CLAY	LIGHT BROWN	8.63	51.56	18.93	
35.00	36.00	1.00	CLAY	LIGHT BROWN	7.57	52.51	19.19	
36.00	37.00	1.00	CLAY	LIGHT BROWN	8.20	52.35	18.16	
37.00	38.00	1.00	CLAY	LIGHT BROWN	8.16	52.08	18.07	
38.00	39.00	1.00	CLAY	LIGHT BROWN	0.70	58.75	20.29	
39.00	40.00	1.00	CLAY	LIGHT BROWN	9.68	46.73	18.54	
40.00	41.00	1.00	CLAY	LIGHT BROWN	7.61	52.40	18.18	
41.00	42.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	10.88	43.85	20.57	
42.00	43.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	9.34	44.23	22.05	
43.00	44.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	12.51	43.23	19.79	
44.00	45.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	15.29	38.48	17.69	
45.00	46.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	6.52	48.67	19.04	
46.00	47.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	8.30	50.63	19.74	
47.00	48.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	10.40	45.80	19.90	
48.00	49.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	14.91	43.04	18.49	
49.00	50.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	17.12	39.80	15.50	
50.00	51.00	1.00	FERRUGINOUS SHALE	LIGHT BROWN	15.32	42.61	16.85	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-12

LATITUDE : 1677901.680
LONGITUDE : 653813.536
REDUCED LEVEL (M): 863.363

DATE OF COMMENCEMENT : 09/02/16
DATE OF CLOSURE : 09/02/16
DEPTH DRILLED (M) : 50.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	FERRUGINOUS SHALE	DARK BROWN	26.41	27.37	22.49	
1.00	2.00	1.00	FERRUGINOUS SHALE	DARK BROWN	22.96	28.58	22.53	
2.00	3.00	1.00	FERRUGINOUS CLAY	DARK BROWN	22.11	28.75	22.44	
3.00	4.00	1.00	FERRUGINOUS CLAY	DARK BROWN	21.99	28.72	22.99	
4.00	5.00	1.00	ALTERED BHQ	DARK BROWN	18.60	30.49	24.67	
5.00	6.00	1.00	ALTERED BHQ	DARK BROWN	18.13	30.53	25.12	
6.00	7.00	1.00	ALTERED BHQ	DARK BROWN	17.31	31.03	24.99	
7.00	8.00	1.00	ALTERED BHQ	DARK BROWN	20.50	30.36	23.06	
8.00	9.00	1.00	CLAY	DARK BROWN	18.77	30.75	25.22	
9.00	10.00	1.00	CLAY	DARK BROWN	14.88	33.31	27.50	
10.00	11.00	1.00	CLAY	DARK BROWN	15.32	33.07	27.34	
11.00	12.00	1.00	CLAY	LIGHT BROWN	16.22	32.23	26.15	
12.00	13.00	1.00	CLAY	LIGHT BROWN	17.15	32.09	25.83	
13.00	14.00	1.00	CLAY	LIGHT BROWN	15.55	33.31	26.11	
14.00	15.00	1.00	CLAY	LIGHT BROWN	14.83	33.84	25.76	
15.00	16.00	1.00	CLAY	LIGHT BROWN	15.28	35.04	24.31	
16.00	17.00	1.00	CLAY	LIGHT BROWN	14.24	37.16	24.20	
17.00	18.00	1.00	CLAY	DARK BROWN	14.40	37.50	23.90	
18.00	19.00	1.00	CLAY	DARK BROWN	17.21	35.22	22.38	
19.00	20.00	1.00	CLAY	DARK BROWN	18.74	33.62	22.56	
20.00	21.00	1.00	CLAY	DARK BROWN	17.15	33.71	24.26	
21.00	22.00	1.00	CLAY	LIGHT BROWN	14.37	35.07	26.07	
22.00	23.00	1.00	CLAY	LIGHT BROWN	15.38	35.60	25.44	
23.00	24.00	1.00	CLAY	LIGHT BROWN	15.27	36.77	24.54	

BOREHOLE NO:MKDR-12

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	CLAY	LIGHT BROWN	15.13	38.09	24.25	
25.00	26.00	1.00	CLAY	LIGHT BROWN	14.44	38.17	24.82	
26.00	27.00	1.00	CLAY	LIGHT BROWN	12.94	37.57	26.04	
27.00	28.00	1.00	CLAY	LIGHT BROWN	15.45	35.43	25.22	
28.00	29.00	1.00	CLAY	LIGHT BROWN	16.11	34.72	24.19	
29.00	30.00	1.00	CLAY	LIGHT BROWN	16.22	35.59	25.08	
30.00	31.00	1.00	CLAY	LIGHT BROWN	15.24	36.16	25.24	
31.00	32.00	1.00	CLAY	LIGHT BROWN	17.58	33.84	24.00	
32.00	33.00	1.00	CLAY	DARK BROWN	17.92	33.67	23.85	
33.00	34.00	1.00	FERRUGINOUS CLAY	DARK BROWN	20.77	31.64	23.19	
34.00	35.00	1.00	FERRUGINOUS CLAY	DARK BROWN	25.12	28.98	21.06	
35.00	36.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	22.49	32.39	19.14	HAEMATITE PIECES
36.00	37.00	1.00	CLAY	YELLOWISH BROWN	13.27	39.81	21.10	
37.00	38.00	1.00	CLAY	YELLOWISH BROWN	16.95	38.23	20.21	
38.00	39.00	1.00	CLAY	YELLOWISH BROWN	18.29	36.05	21.52	
39.00	40.00	1.00	CLAY	DARK BROWN	18.98	34.54	21.16	
40.00	41.00	1.00	CLAY	DARK BROWN	18.51	34.78	21.45	
41.00	42.00	1.00	CLAY	DARK BROWN	17.55	35.11	22.08	
42.00	43.00	1.00	CLAY	DARK BROWN	15.93	36.08	22.63	
43.00	44.00	1.00	CLAY	DARK BROWN	16.40	35.82	22.34	
44.00	45.00	1.00	CLAY	DARK BROWN	13.39	39.19	22.50	
45.00	46.00	1.00	CLAY	LIGHT BROWN	15.18	37.31	21.54	
46.00	47.00	1.00	CLAY	LIGHT BROWN	13.97	39.95	21.58	
47.00	48.00	1.00	CLAY	LIGHT BROWN	12.95	40.31	21.76	
48.00	49.00	1.00	CLAY	LIGHT BROWN	12.36	41.53	21.91	
49.00	50.00	1.00	CLAY	LIGHT BROWN	13.12	40.78	21.64	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-13

LATITUDE : 1677876.451 — **DATE OF COMMENCEMENT : 09/02/16**
LONGITUDE : 653654.295 — **DATE OF CLOSURE : 10/02/16**
REDUCED LEVEL (M): 911.686 — **DEPTH DRILLED (M) : 75.00**

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	ALTERED BHQ	YELLOWISH BROWN	17.55	47.67	15.17	
1.00	2.00	1.00	SOFT LAMINATED ORE	CHERRY RED	52.37	8.57	9.45	
2.00	3.00	1.00	SOFT LAMINATED ORE	CHERRY RED	57.16	6.20	6.27	
3.00	4.00	1.00	SOFT LAMINATED ORE	CHERRY RED	63.46	3.17	3.37	
4.00	5.00	1.00	SOFT LAMINATED ORE	CHERRY RED	63.88	1.48	2.91	
5.00	6.00	1.00	SOFT LAMINATED ORE	CHERRY RED	66.48	1.07	1.91	
6.00	7.00	1.00	SOFT LAMINATED ORE	CHERRY RED	65.14	2.21	2.71	
7.00	8.00	1.00	SOFT LAMINATED ORE	DARK GREY	65.90	3.28	1.48	
8.00	9.00	1.00	SOFT LAMINATED ORE	DARK GREY	61.96	6.42	3.97	
9.00	10.00	1.00	SOFT LAMINATED ORE	DARK GREY	62.36	3.88	4.83	
10.00	11.00	1.00	SOFT LAMINATED ORE	DARK GREY	67.21	0.64	2.04	
11.00	12.00	1.00	BHQ	DARK GREY	62.81	3.34	5.14	
12.00	13.00	1.00	POWDERY ORE	DARK GREY	54.74	8.28	9.02	
13.00	14.00	1.00	POWDERY ORE	DARK GREY	64.87	1.62	2.62	
14.00	15.00	1.00	POWDERY ORE	DARK GREY	66.07	0.95	2.36	
15.00	16.00	1.00	POWDERY ORE	DARK GREY	66.90	1.05	1.49	
16.00	17.00	1.00	POWDERY ORE	DARK GREY	64.30	0.70	3.13	
17.00	18.00	1.00	POWDERY ORE	DARK GREY	65.05	1.05	2.88	
18.00	19.00	1.00	SOFT LAMINATED ORE	DARK GREY	64.92	2.22	2.95	
19.00	20.00	1.00	SOFT LAMINATED ORE	DARK GREY	62.86	4.86	3.82	
20.00	21.00	1.00	SOFT LAMINATED ORE	DARK GREY	64.95	2.27	2.78	
21.00	22.00	1.00	SOFT LAMINATED ORE	DARK GREY	62.55	4.95	4.53	
22.00	23.00	1.00	SOFT LAMINATED ORE	DARK GREY	62.82	4.70	4.16	
23.00	24.00	1.00	SOFT LAMINATED ORE	DARK BROWN	65.40	2.26	2.63	

BOREHOLE NO:MKDR-13

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	SOFT LAMINATED ORE	DARK BROWN	65.65	2.86	2.81	
25.00	26.00	1.00	POWDERY ORE	DARK BROWN	62.28	5.18	4.81	
26.00	27.00	1.00	POWDERY ORE	DARK BROWN	63.87	4.31	3.81	
27.00	28.00	1.00	POWDERY ORE	DARK BROWN	64.23	3.56	3.64	
28.00	29.00	1.00	POWDERY ORE	DARK BROWN	54.94	10.20	9.87	
29.00	30.00	1.00	POWDERY ORE	DARK BROWN	39.95	21.87	19.87	
30.00	31.00	1.00	POWDERY ORE	DARK BROWN	52.35	11.27	9.84	
31.00	32.00	1.00	POWDERY ORE	DARK BROWN	56.65	9.08	7.35	
32.00	33.00	1.00	POWDERY ORE	DARK BROWN	46.73	14.18	14.58	
33.00	34.00	1.00	CLAYEY IRON ORE	DARK BROWN	33.70	24.48	23.21	
34.00	35.00	1.00	CLAYEY IRON ORE	DARK BROWN	25.63	27.47	25.85	OCC.HAEMATITE PIECES
35.00	36.00	1.00	CLAYEY IRON ORE	DARK BROWN	46.78	14.27	15.04	OCC.HAEMATITE PIECES
36.00	37.00	1.00	CLAYEY IRON ORE	DARK BROWN	47.11	14.42	14.42	OCC.HAEMATITE PIECES
37.00	38.00	1.00	CLAYEY IRON ORE	DARK BROWN	48.45	13.13	12.23	OCC.HAEMATITE PIECES
38.00	39.00	1.00	SOFT LAMINATED ORE	DARK BROWN	58.79	5.88	4.55	OCC.HAEMATITE PIECES
39.00	40.00	1.00	SOFT LAMINATED ORE	DARK BROWN	54.52	8.76	6.53	OCC.HAEMATITE PIECES
40.00	41.00	1.00	SOFT LAMINATED ORE	DARK BROWN	54.63	9.02	6.12	
41.00	42.00	1.00	SOFT LAMINATED ORE	DARK BROWN	50.37	11.03	7.75	
42.00	43.00	1.00	SOFT LAMINATED ORE	DARK BROWN	51.05	10.14	8.00	
43.00	44.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	55.33	8.40	5.04	
44.00	45.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	48.37	15.81	6.75	
45.00	46.00	1.00	SOIL WITH FLOAT ORE	YELLOWISH BROWN	52.76	8.74	5.30	
46.00	47.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	56.27	7.43	4.51	
47.00	48.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	45.25	20.73	4.51	
48.00	49.00	1.00	FERRUGINOUS CLAY	YELLOWISH BROWN	27.84	50.04	3.54	SILICEOUS
49.00	50.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	42.98	26.59	5.21	SILICEOUS
50.00	51.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	29.52	48.54	4.93	
51.00	52.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	14.00	74.38	2.94	
52.00	53.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	31.39	45.41	6.69	
53.00	54.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	25.51	51.10	6.59	
54.00	55.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	22.35	55.29	6.68	

BOREHOLE NO:MKDR-13

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	CLAY	REDDISH BROWN	13.91	65.39	7.72	
56.00	57.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	17.97	57.69	9.13	
57.00	58.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	23.78	50.99	8.35	
58.00	59.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	24.10	48.85	9.78	
59.00	60.00	1.00	FERRUGINOUS CLAY	REDDISH BROWN	19.22	54.71	9.70	
60.00	61.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	29.06	46.47	7.58	
61.00	62.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	32.37	37.12	10.03	
62.00	63.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	30.61	44.93	7.14	
63.00	64.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	27.27	46.38	8.35	
64.00	65.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	23.21	49.77	8.94	
65.00	66.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	25.45	48.96	8.89	
66.00	67.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	26.84	48.26	7.50	
67.00	68.00	1.00	CLAYEY IRON ORE	REDDISH BROWN	21.89	49.32	10.68	
68.00	69.00	1.00	CLAYEY IRON ORE	CHERRY RED	21.07	48.17	12.71	
69.00	70.00	1.00	CLAYEY IRON ORE	CHERRY RED	25.74	44.57	11.99	
70.00	71.00	1.00	CLAYEY IRON ORE	CHERRY RED	29.45	39.21	10.16	
71.00	72.00	1.00	SOFT LAMINATED ORE	CHERRY RED	46.06	24.34	8.52	
72.00	73.00	1.00	SOFT LAMINATED ORE	CHERRY RED	31.79	43.61	7.73	
73.00	74.00	1.00	SOFT LAMINATED ORE	CHERRY RED	28.18	45.97	8.51	
74.00	75.00	1.00	SOFT LAMINATED ORE	CHERRY RED	40.23	30.46	8.82	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-14

LATITUDE : 1678207.223
LONGITUDE : 653609.529
REDUCED LEVEL (M): 797.330
DATE OF COMMENCEMENT : 11/02/16
DATE OF CLOSURE : 11/02/16
DEPTH DRILLED (M) : 35.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	CLAY	DARK BROWN	12.01	43.41	14.86	
1.00	2.00	1.00	CLAY	YELLOW	8.31	48.13	10.09	
2.00	3.00	1.00	CLAY	YELLOW	8.79	47.99	9.52	
3.00	4.00	1.00	CLAY	YELLOW	8.74	48.18	10.75	
4.00	5.00	1.00	CLAY	YELLOW	11.38	45.62	11.81	
5.00	6.00	1.00	CLAY	YELLOW	8.87	48.21	10.28	
6.00	7.00	1.00	CLAY	YELLOW	9.37	47.54	9.86	
7.00	8.00	1.00	CLAY	YELLOW	8.07	49.60	8.91	
8.00	9.00	1.00	CLAY	LIGHT BROWN	7.82	49.55	8.64	
9.00	10.00	1.00	CLAY	LIGHT BROWN	7.85	49.57	8.77	
10.00	11.00	1.00	CLAY	LIGHT BROWN	7.85	49.51	8.40	
11.00	12.00	1.00	CLAY	LIGHT BROWN	8.25	49.51	9.10	
12.00	13.00	1.00	CLAY	LIGHT BROWN	7.94	49.54	10.86	
13.00	14.00	1.00	CLAY	LIGHT BROWN	8.02	48.89	12.65	
14.00	15.00	1.00	CLAY	LIGHT BROWN	7.93	47.40	15.60	
15.00	16.00	1.00	CLAY	LIGHT BROWN	6.93	41.93	24.53	
16.00	17.00	1.00	CLAY	LIGHT BROWN	10.71	38.12	26.92	
17.00	18.00	1.00	CLAY	LIGHT BROWN	9.16	39.08	29.62	
18.00	19.00	1.00	CLAY	LIGHT BROWN	10.17	37.76	27.01	
19.00	20.00	1.00	CLAY	LIGHT BROWN	9.14	39.24	28.64	
20.00	21.00	1.00	CLAY	LIGHT BROWN	14.93	36.75	25.12	
21.00	22.00	1.00	CLAY	LIGHT BROWN	1.58	52.76	23.05	
22.00	23.00	1.00	CLAY	LIGHT BROWN	4.19	52.53	21.97	
23.00	24.00	1.00	CLAY	LIGHT BROWN	6.78	46.38	24.39	

BOREHOLE NO:MKDR-14

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	CLAY	LIGHT BROWN	10.40	40.04	26.40	
25.00	26.00	1.00	CLAY	LIGHT BROWN	10.75	38.91	26.86	
26.00	27.00	1.00	CLAY	LIGHT BROWN	9.92	39.73	27.92	
27.00	28.00	1.00	CLAY	LIGHT BROWN	11.01	45.24	20.77	
28.00	29.00	1.00	CLAY	LIGHT BROWN	11.75	42.28	21.89	
29.00	30.00	1.00	CLAY	LIGHT BROWN	9.84	50.55	18.73	
30.00	31.00	1.00	CLAY	LIGHT BROWN	9.17	51.80	18.11	
31.00	32.00	1.00	CLAY	LIGHT BROWN	6.87	52.78	19.76	
32.00	33.00	1.00	CLAY	LIGHT BROWN	8.15	53.10	18.36	
33.00	34.00	1.00	CLAY	LIGHT BROWN	9.05	50.87	19.23	
34.00	35.00	1.00	CLAY	LIGHT BROWN	10.91	44.16	21.27	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-15

LATITUDE : 1678328.578
LONGITUDE : 653513.103
REDUCED LEVEL (M): 830.306

DATE OF COMMENCEMENT : 12/02/16
DATE OF CLOSURE : 12/02/16
DEPTH DRILLED (M) : 105.00

DEPTH (M) FROM	TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	SILICEOUS IRON ORE	YELLOWISH BROWN	36.24	41.56	5.58	
1.00	2.00	1.00	SILICEOUS IRON ORE	YELLOWISH BROWN	31.33	33.35	13.20	
2.00	3.00	1.00	LIMONITIC CLAY	YELLOW	26.73	31.19	18.13	
3.00	4.00	1.00	LIMONITIC CLAY	YELLOW	19.61	30.36	22.38	
4.00	5.00	1.00	LIMONITIC CLAY	YELLOW	31.25	24.77	19.13	
5.00	6.00	1.00	LIMONITIC CLAY	YELLOW	29.99	25.67	19.67	
6.00	7.00	1.00	LIMONITIC CLAY	YELLOW	34.84	35.10	8.96	
7.00	8.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.17	42.55	2.82	
8.00	9.00	1.00	SILICEOUS IRON ORE	DARK BROWN	46.58	31.26	1.57	
9.00	10.00	1.00	HAEMATITIC ORE	DARK GREY	42.85	34.39	1.24	
10.00	11.00	1.00	SILICEOUS IRON ORE	DARK GREY	42.35	37.31	1.26	
11.00	12.00	1.00	SILICEOUS IRON ORE	DARK GREY	42.79	34.95	1.00	
12.00	13.00	1.00	SILICEOUS IRON ORE	DARK GREY	42.35	37.75	1.47	
13.00	14.00	1.00	SILICEOUS IRON ORE	DARK GREY	41.90	37.87	1.71	
14.00	15.00	1.00	SILICEOUS IRON ORE	DARK GREY	41.58	37.48	2.49	
15.00	16.00	1.00	SILICEOUS IRON ORE	DARK GREY	42.19	37.83	1.63	
16.00	17.00	1.00	SILICEOUS IRON ORE	DARK BROWN	42.05	37.84	1.34	
17.00	18.00	1.00	SILICEOUS IRON ORE	DARK BROWN	42.09	37.68	1.55	
18.00	19.00	1.00	SILICEOUS IRON ORE	DARK BROWN	41.65	38.85	1.26	
19.00	20.00	1.00	SILICEOUS IRON ORE	DARK BROWN	41.08	39.28	1.24	
20.00	21.00	1.00	SILICEOUS IRON ORE	DARK BROWN	37.70	36.99	8.43	OCC.CLAYEY
21.00	22.00	1.00	SILICEOUS IRON ORE	STEEL GREY	38.15	31.83	10.54	OCC.CLAYEY
22.00	23.00	1.00	SILICEOUS IRON ORE	STEEL GREY	40.29	37.83	3.96	
23.00	24.00	1.00	SILICEOUS IRON ORE	STEEL GREY	39.88	39.09	3.79	

BOREHOLE NO:MKDR-15

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
24.00	25.00	1.00	SILICEOUS IRON ORE	STEEL GREY	40.10	39.21	2.87	
25.00	26.00	1.00	SILICEOUS IRON ORE	STEEL GREY	40.81	39.00	1.53	
26.00	27.00	1.00	SILICEOUS IRON ORE	STEEL GREY	41.05	38.78	1.60	
27.00	28.00	1.00	SILICEOUS IRON ORE	STEEL GREY	40.02	39.90	2.46	
28.00	29.00	1.00	SILICEOUS IRON ORE	STEEL GREY	38.07	43.36	2.02	
29.00	30.00	1.00	SILICEOUS IRON ORE	STEEL GREY	38.37	42.11	2.80	
30.00	31.00	1.00	SILICEOUS IRON ORE	STEEL GREY	36.87	43.97	3.28	
31.00	32.00	1.00	SILICEOUS IRON ORE	STEEL GREY	38.13	41.80	3.03	
32.00	33.00	1.00	SILICEOUS IRON ORE	STEEL GREY	38.35	41.83	2.50	
33.00	34.00	1.00	SILICEOUS IRON ORE	STEEL GREY	38.62	42.84	1.59	
34.00	35.00	1.00	SILICEOUS IRON ORE	STEEL GREY	39.56	42.05	1.23	
35.00	36.00	1.00	SILICEOUS IRON ORE	STEEL GREY	40.07	41.07	1.40	
36.00	37.00	1.00	SILICEOUS IRON ORE	STEEL GREY	40.05	41.52	1.03	
37.00	38.00	1.00	SILICEOUS IRON ORE	STEEL GREY	39.64	41.73	1.31	
38.00	39.00	1.00	SILICEOUS IRON ORE	STEEL GREY	39.14	42.10	1.30	
39.00	40.00	1.00	SILICEOUS IRON ORE	STEEL GREY	39.56	41.57	0.96	
40.00	41.00	1.00	SILICEOUS IRON ORE	DARK BROWN	41.55	38.96	0.93	
41.00	42.00	1.00	SILICEOUS IRON ORE	CHERRY RED	40.43	40.76	0.76	
42.00	43.00	1.00	SILICEOUS IRON ORE	CHERRY RED	39.16	40.84	3.10	
43.00	44.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.57	47.69	1.38	
44.00	45.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.02	45.78	1.16	
45.00	46.00	1.00	SILICEOUS IRON ORE	CHERRY RED	39.06	43.13	0.94	
46.00	47.00	1.00	SILICEOUS IRON ORE	CHERRY RED	40.09	41.82	0.74	
47.00	48.00	1.00	SILICEOUS IRON ORE	CHERRY RED	40.59	41.17	0.63	
48.00	49.00	1.00	SILICEOUS IRON ORE	CHERRY RED	38.41	44.06	0.67	
49.00	50.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.98	46.59	1.44	
50.00	51.00	1.00	SILICEOUS IRON ORE	CHERRY RED	33.79	47.65	2.66	
51.00	52.00	1.00	SILICEOUS IRON ORE	CHERRY RED	30.97	51.41	1.55	
52.00	53.00	1.00	SILICEOUS IRON ORE	CHERRY RED	30.86	52.23	1.35	
53.00	54.00	1.00	SILICEOUS IRON ORE	CHERRY RED	30.07	53.15	1.42	
54.00	55.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.52	46.50	1.69	

BOREHOLE NO:MKDR-15

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
55.00	56.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	17.48	35.07	23.38	
56.00	57.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.71	42.72	3.07	
57.00	58.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	38.05	42.96	2.03	
58.00	59.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	37.48	43.71	1.92	
59.00	60.00	1.00	SILICEOUS IRON ORE	LIGHT BROWN	35.28	47.51	1.29	
60.00	61.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.05	45.23	1.35	
61.00	62.00	1.00	SILICEOUS IRON ORE	CHERRY RED	36.49	46.65	0.89	
62.00	63.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.68	44.85	1.02	
63.00	64.00	1.00	SILICEOUS IRON ORE	CHERRY RED	34.59	48.72	0.97	
64.00	65.00	1.00	SILICEOUS IRON ORE	CHERRY RED	38.04	43.19	2.34	
65.00	66.00	1.00	SILICEOUS IRON ORE	CHERRY RED	38.43	43.52	1.06	
66.00	67.00	1.00	SILICEOUS IRON ORE	CHERRY RED	39.41	42.68	0.87	
67.00	68.00	1.00	SILICEOUS IRON ORE	CHERRY RED	39.83	41.59	1.17	
68.00	69.00	1.00	SILICEOUS IRON ORE	CHERRY RED	39.38	42.51	0.82	
69.00	70.00	1.00	SILICEOUS IRON ORE	CHERRY RED	39.59	42.53	0.82	
70.00	71.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.79	47.45	0.97	
71.00	72.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.39	47.90	1.06	
72.00	73.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.82	47.32	1.21	
73.00	74.00	1.00	SILICEOUS IRON ORE	CHERRY RED	36.00	47.45	0.95	
74.00	75.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.35	44.53	1.92	
75.00	76.00	1.00	SILICEOUS IRON ORE	CHERRY RED	36.86	43.60	3.34	
76.00	77.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.10	45.48	1.31	
77.00	78.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.27	44.86	1.50	
78.00	79.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.16	48.45	1.26	
79.00	80.00	1.00	SILICEOUS IRON ORE	CHERRY RED	33.91	49.95	1.16	
80.00	81.00	1.00	SILICEOUS IRON ORE	CHERRY RED	34.26	49.69	0.74	
81.00	82.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.11	46.48	2.94	
82.00	83.00	1.00	SILICEOUS IRON ORE	CHERRY RED	36.00	47.32	0.76	
83.00	84.00	1.00	SILICEOUS IRON ORE	CHERRY RED	38.07	44.37	0.74	
84.00	85.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.45	45.46	0.76	
85.00	86.00	1.00	SILICEOUS IRON ORE	CHERRY RED	37.01	45.89	1.00	

BOREHOLE NO:MKDR-15

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
86.00	87.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.18	47.86	0.84	
87.00	88.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.81	47.10	1.04	
88.00	89.00	1.00	SILICEOUS IRON ORE	CHERRY RED	36.50	46.69	0.82	
89.00	90.00	1.00	SILICEOUS IRON ORE	CHERRY RED	39.54	42.50	0.78	
90.00	91.00	1.00	SILICEOUS IRON ORE	CHERRY RED	35.28	48.39	0.88	
91.00	92.00	1.00	SILICEOUS IRON ORE	CHERRY RED	38.18	44.02	0.89	
92.00	93.00	1.00	SILICEOUS IRON ORE	CHERRY RED	36.62	46.57	0.95	
93.00	94.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.21	42.08	1.54	
94.00	95.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.66	43.53	1.11	
95.00	96.00	1.00	SILICEOUS IRON ORE	DARK BROWN	38.92	42.86	1.31	
96.00	97.00	1.00	SILICEOUS IRON ORE	DARK BROWN	39.38	41.45	1.44	
97.00	98.00	1.00	SILICEOUS IRON ORE	DARK BROWN	40.35	40.28	1.15	
98.00	99.00	1.00	SILICEOUS IRON ORE	DARK BROWN	39.75	41.38	1.22	
99.00	100.00	1.00	SILICEOUS IRON ORE	DARK BROWN	37.15	45.89	0.92	
100.00	101.00	1.00	SILICEOUS IRON ORE	DARK BROWN	36.19	46.79	1.05	
101.00	102.00	1.00	SILICEOUS IRON ORE	DARK BROWN	34.61	49.23	1.16	
102.00	103.00	1.00	SILICEOUS IRON ORE	DARK BROWN	35.92	47.12	1.06	
103.00	104.00	1.00	SILICEOUS IRON ORE	DARK BROWN	35.25	48.08	1.07	
104.00	105.00	1.00	SILICEOUS IRON ORE	DARK BROWN	33.88	49.70	1.07	

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKDR-16

LATITUDE : 1678283.410
LONGITUDE : 653555.248
REDUCED LEVEL (M): 823.415

DATE OF COMMENCEMENT : 12/02/16
DATE OF CLOSURE : 12/02/16
DEPTH DRILLED (M) : 25.00

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	FERRUGINOUS CLAY	DARK BROWN	13.24	37.58	27.38	
1.00	2.00	1.00	FERRUGINOUS CLAY	DARK BROWN	12.50	38.71	27.76	
2.00	3.00	1.00	FERRUGINOUS CLAY	DARK BROWN	13.98	37.06	26.07	
3.00	4.00	1.00	FERRUGINOUS CLAY	DARK BROWN	17.16	36.09	23.89	
4.00	5.00	1.00	FERRUGINOUS CLAY	DARK BROWN	19.27	37.13	18.35	
5.00	6.00	1.00	FERRUGINOUS CLAY	DARK BROWN	14.73	41.27	19.54	
6.00	7.00	1.00	FERRUGINOUS CLAY	DARK BROWN	15.56	39.56	18.51	
7.00	8.00	1.00	FERRUGINOUS CLAY	DARK BROWN	17.78	35.81	19.84	
8.00	9.00	1.00	FERRUGINOUS SHALE	DARK BROWN	20.14	33.25	21.50	
9.00	10.00	1.00	FERRUGINOUS SHALE	DARK BROWN	24.23	31.60	17.84	
10.00	11.00	1.00	FERRUGINOUS CLAY	DARK BROWN	22.45	31.74	20.46	
11.00	12.00	1.00	FERRUGINOUS CLAY	DARK BROWN	10.71	44.43	20.33	
12.00	13.00	1.00	FERRUGINOUS CLAY	DARK BROWN	11.51	45.30	19.31	
13.00	14.00	1.00	FERRUGINOUS CLAY	DARK BROWN	12.81	42.80	19.52	
14.00	15.00	1.00	FERRUGINOUS CLAY	DARK BROWN	14.77	41.52	19.61	
15.00	16.00	1.00	FERRUGINOUS CLAY	DARK BROWN	16.30	36.72	23.37	
16.00	17.00	1.00	FERRUGINOUS CLAY	DARK BROWN	14.80	36.46	26.48	
17.00	18.00	1.00	FERRUGINOUS CLAY	DARK BROWN	15.75	35.90	24.33	
18.00	19.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	15.73	36.49	24.29	
19.00	20.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	15.46	37.10	24.39	
20.00	21.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	11.17	40.58	25.49	
21.00	22.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	18.93	39.74	18.35	
22.00	23.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	15.75	41.03	19.01	
23.00	24.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	17.15	39.74	18.80	
24.00	25.00	1.00	FERRUGINOUS CLAY	LIGHT BROWN	18.12	35.81	19.99	

ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKD-3

LATITUDE : 1677626.093
LONGITUDE : 654021.455
REDUCED LEVEL (M): 880.014

DATE OF COMMENCEMENT : 04/02/16
DATE OF CLOSURE : 16/02/16
DEPTH DRILLED (M) : 75.50

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	TRUE THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	0.85	0.85	0.80	HAEMATITIC ORE	DARK BROWN	59.21	7.84	6.53	
0.85	1.65	0.80	0.75	HAEMATITIC ORE	DARK BROWN	45.00	21.07	14.34	
1.65	2.20	0.55	0.52	HAEMATITIC ORE	DARK BROWN	50.61	12.34	8.51	
2.20	3.00	0.80	0.75	HAEMATITIC ORE	DARK BROWN	47.00	21.15	11.14	
3.00	3.50	0.50	0.47	HAEMATITIC ORE	DARK BROWN	37.74	22.37	18.23	
3.50	4.50	1.00	0.94	FERRUGINOUS SHALE	YELLOWISH BROWN	23.48	28.76	22.77	
4.50	5.40	0.90	0.85	HAEMATITIC ORE	DARK BROWN	32.19	21.84	17.23	
5.40	6.10	0.70	0.66	SHALE	YELLOWISH BROWN	36.92	20.45	13.53	
6.10	7.60	1.50	1.41	CLAYEY IRON ORE	DARK BROWN	33.02	21.66	16.98	
7.60	8.90	1.30	1.22	POWDERY ORE	DARK GREY	48.55	14.79	11.19	
8.90	10.20	1.30	1.22	POWDERY ORE	DARK GREY	58.07	8.65	7.93	
10.20	11.15	0.95	0.89	SILICEOUS IRON ORE	DARK GREY	59.13	8.01	7.02	
11.15	11.90	0.75	0.71	SILICEOUS IRON ORE	DARK GREY	60.76	6.74	5.84	
11.90	12.77	0.87	0.82	SILICEOUS IRON ORE	DARK GREY	42.33	30.51	3.56	
12.77	15.65	2.88	2.71	SILICEOUS IRON ORE	DARK GREY	23.47	60.18	1.61	
15.65	17.80	2.15	2.02	SILICEOUS IRON ORE	DARK GREY	36.05	46.55	1.61	
17.80	20.20	2.40	2.26	SILICEOUS IRON ORE	DARK GREY	33.31	50.38	1.36	
20.20	23.60	3.40	3.20	SILICEOUS IRON ORE	DARK GREY	38.48	43.30	1.52	
23.60	25.14	1.54	1.45	SILICEOUS IRON ORE	DARK GREY	40.40	39.12	2.19	
25.14	25.90	0.76	0.71	FERRUGINOUS CLAY	DARK GREY	23.01	33.12	19.35	
25.90	28.30	2.40	2.26	FERRUGINOUS SHALE	YELLOWISH BROWN	17.00	36.15	19.93	
28.30	29.90	1.60	1.50	FERRUGINOUS SHALE	LIGHT GREY	18.86	33.67	20.83	
29.90	33.20	3.30	3.10	FERRUGINOUS CLAY	LIGHT GREY	23.19	31.56	19.09	
33.20	35.20	2.00	1.88	FERRUGINOUS SHALE	LIGHT GREY	21.24	31.43	18.16	
35.20	36.30	1.10	1.03	SILICEOUS IRON ORE	LIGHT GREY	21.41	31.87	20.28	
36.30	37.30	1.00	0.94	SHALE	LIGHT GREY	7.41	42.36	24.62	
37.30	40.10	2.80	2.63	SHALE	LIGHT GREY	9.78	40.69	23.70	
40.10	42.50	2.40	2.26	SHALE	LIGHT GREY	10.01	40.35	23.28	
42.50	44.30	1.80	1.69	SILICEOUS IRON ORE	DARK GREY	13.75	40.96	16.61	

-

ANNEXURE-IV/2

BOREHOLE NO:MKD-3

DEPTH (M)		THICK-NESS (m)	TRUE THICK-NESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
FROM	TO								
44.30	47.00	2.70	2.54	SILICEOUS IRON ORE	DARK GREY	18.90	43.44	14.74	
47.00	50.40	3.40	3.20	SILICEOUS IRON ORE	DARK GREY	32.02	52.05	1.99	
50.40	53.50	3.10	2.91	SILICEOUS IRON ORE	DARK GREY	28.30	56.62	1.43	
53.50	55.85	2.35	2.21	SILICEOUS IRON ORE	DARK GREY	32.19	50.99	1.92	
55.85	59.70	3.85	3.62	SILICEOUS IRON ORE	DARK GREY	35.28	47.57	1.60	
59.70	62.55	2.85	2.68	SILICEOUS IRON ORE	DARK GREY	39.27	42.51	1.24	
62.55	64.40	1.85	1.74	SILICEOUS IRON ORE	DARK GREY	34.51	49.19	1.15	
64.40	66.00	1.60	1.50	SILICEOUS IRON ORE	DARK GREY	34.22	49.01	1.17	
66.00	68.20	2.20	2.07	SILICEOUS IRON ORE	DARK GREY	36.58	46.33	1.10	
68.20	70.70	2.50	2.35	SILICEOUS IRON ORE	DARK GREY	39.18	42.35	1.11	
70.70	73.00	2.30	2.16	SILICEOUS IRON ORE	DARK GREY	29.03	56.11	0.85	
73.00	75.50	2.50	2.35	SILICEOUS IRON ORE	DARK GREY	39.18	41.56	1.62	

ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKD-17

LATITUDE : 1677835.931
LONGITUDE : 653779.732
REDUCED LEVEL (M): 883.106

DATE OF COMMENCEMENT : 13/02/16
DATE OF CLOSURE : 17/02/16
DEPTH DRILLED (M) : 46.60

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	TRUE THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.05	1.05	0.99	POWDERY ORE		57.54	11.38	4.58	
1.05	1.28	0.23	0.22	HAEMATITIC ORE	STEEL GREY	61.22	7.95	2.29	
1.28	2.10	0.82	0.77	HAEMATITIC ORE	STEEL GREY	59.29	9.58	3.37	
2.10	2.90	0.80	0.75	HAEMATITIC ORE	STEEL GREY	66.72	1.70	0.93	
2.90	3.46	0.56	0.53	HAEMATITIC ORE	STEEL GREY	62.57	4.55	2.09	
3.46	4.10	0.64	0.60	SILICEOUS IRON ORE	DARK GREY	49.40	25.18	2.32	
4.10	4.50	0.40	0.38	HAEMATITIC ORE	DARK GREY	62.15	4.57	1.97	
4.50	5.60	1.10	1.03	SILICEOUS IRON ORE	DARK GREY	51.73	22.26	3.74	
5.60	6.20	0.60	0.56	SILICEOUS IRON ORE	DARK GREY	47.33	27.22	2.47	
6.20	7.50	1.30	1.22	SILICEOUS IRON ORE	DARK GREY	47.20	27.45	1.63	FRIABLE
7.50	8.50	1.00	0.94	SILICEOUS IRON ORE	DARK GREY	46.94	27.30	1.38	
8.50	8.99	0.49	0.46	SILICEOUS IRON ORE	DARK GREY	42.52	32.95	1.55	
8.99	9.76	0.77	0.72	HAEMATITIC ORE	LIGHT GREY	59.12	9.29	2.31	
9.76	10.50	0.74	0.70	SILICEOUS IRON ORE	LIGHT GREY	39.29	42.56	1.21	
10.50	11.50	1.00	0.94	SILICEOUS IRON ORE	LIGHT GREY	38.15	44.00	0.92	
11.50	12.50	1.00	0.94	SILICEOUS IRON ORE	LIGHT GREY	44.48	32.34	1.38	
12.50	13.15	0.65	0.61	SILICEOUS IRON ORE	LIGHT GREY	41.33	39.21	1.66	
13.15	14.26	1.11	1.04	POWDERY ORE	LIGHT GREY	37.14	45.50	1.27	
14.26	15.50	1.24	1.17	SOFT LAMINATED ORE	LIGHT GREY	39.25	41.20	1.88	
15.50	16.50	1.00	0.94	SOFT LAMINATED ORE	LIGHT GREY	42.24	34.64	2.18	
16.50	17.50	1.00	0.94	SOFT LAMINATED ORE	LIGHT GREY	48.13	26.92	3.91	SILICEOUS
17.50	17.78	0.28	0.26	SOFT LAMINATED ORE	LIGHT GREY	29.45	54.44	1.08	
17.78	18.06	0.28	0.26	SILICEOUS IRON ORE	LIGHT GREY	38.78	42.85	1.65	
18.06	19.16	1.10	1.03	SOFT LAMINATED ORE	LIGHT GREY	44.79	31.53	2.42	
19.16	19.50	0.34	0.32	SILICEOUS IRON ORE	LIGHT GREY	41.85	33.90	3.04	
19.50	19.85	0.35	0.33	SILICEOUS IRON ORE	DARK GREY	44.05	32.52	4.28	
19.85	20.77	0.92	0.86	SILICEOUS IRON ORE	DARK GREY	40.35	39.50	2.49	
20.77	22.10	1.33	1.25	SILICEOUS IRON ORE	DARK GREY	40.26	40.53	1.18	
22.10	24.55	2.45	2.30	SILICEOUS IRON ORE	DARK GREY	26.00	58.69	0.93	

-

BOREHOLE NO:MKD-17

DEPTH (M)		THICK-NESS (m)	TRUE THICK-NESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
FROM	TO								
24.55	27.30	2.75	2.59	SILICEOUS IRON ORE	DARK GREY	29.28	54.07	1.14	
27.30	29.30	2.00	1.88	SILICEOUS IRON ORE	DARK GREY	33.73	49.30	0.92	
29.30	30.00	0.70	0.66	SILICEOUS IRON ORE	DARK GREY	34.88	48.69	0.96	
30.00	30.30	0.30	0.28	LIMONITIC ORE	YELLOWISH BROWN	61.50	6.07	1.71	
30.30	32.60	2.30	2.16	SILICEOUS IRON ORE	DARK GREY	30.68	51.57	1.99	
32.60	33.30	0.70	0.66	CLAYEY IRON ORE	LIGHT GREY	9.67	37.84	29.92	
33.30	35.40	2.10	1.97	SILICEOUS IRON ORE	DARK GREY	35.03	47.80	1.67	
35.40	37.40	2.00	1.88	SILICEOUS IRON ORE	DARK GREY	35.47	46.47	2.55	
37.40	39.60	2.20	2.07	SILICEOUS IRON ORE	DARK GREY	36.29	45.26	2.81	
39.60	42.40	2.80	2.63	SILICEOUS IRON ORE	DARK GREY	34.73	47.05	2.98	
42.40	45.00	2.60	2.44	SILICEOUS IRON ORE	DARK GREY	38.19	42.08	3.28	
45.00	45.50	0.50	0.47	FERRUGINOUS CLAY	DARK GREY	20.18	35.51	19.81	
45.50	46.60	1.10	1.03	SILICEOUS IRON ORE	DARK GREY	43.19	22.91	8.12	

ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKD-18

LATITUDE : 1677783.706
LONGITUDE : 653888.092
REDUCED LEVEL (M): 874.392

DATE OF COMMENCEMENT : 17/02/16
DATE OF CLOSURE : 21/02/16
DEPTH DRILLED (M) : 53.00

DEPTH (M) FROM	TO	THICKNESS (m)	TRUE THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	0.50	0.50	0.47	POWDERY ORE	DARK GREY	67.64	1.97	0.79	
0.50	1.10	0.60	0.56	POWDERY ORE	DARK GREY	65.88	3.89	0.57	
1.10	2.00	0.90	0.85	POWDERY ORE	DARK GREY	64.84	4.05	0.49	
2.00	3.25	1.25	1.18	POWDERY ORE	DARK GREY	62.37	6.21	1.47	
3.25	4.30	1.05	0.99	SOFT LAMINATED ORE	DARK GREY	60.29	11.29	0.40	
4.30	5.00	0.70	0.66	HAEMATITIC ORE	STEEL GREY	59.03	13.36	0.50	
5.00	5.70	0.70	0.66	POWDERY ORE	DARK GREY	62.14	7.00	1.00	
5.70	6.40	0.70	0.66	POWDERY ORE	DARK GREY	61.89	6.42	1.20	
6.40	6.90	0.50	0.47	POWDERY ORE	DARK GREY	32.73	51.61	0.67	
6.90	7.80	0.90	0.85	POWDERY ORE	DARK GREY	53.08	22.39	0.82	
7.80	8.80	1.00	0.94	SILICEOUS IRON ORE	LIGHT GREY	44.35	31.48	0.55	
8.80	9.45	0.65	0.61	SILICEOUS IRON ORE	LIGHT GREY	43.62	33.42	0.51	
9.45	10.60	1.15	1.08	SILICEOUS IRON ORE	LIGHT GREY	39.27	42.24	0.58	
10.60	11.75	1.15	1.08	SILICEOUS IRON ORE	LIGHT GREY	39.29	42.57	0.64	
11.75	14.35	2.60	2.44	SILICEOUS IRON ORE	DARK GREY	38.27	44.31	0.87	
14.35	16.90	2.55	2.40	SILICEOUS IRON ORE	DARK GREY	33.85	48.81	1.29	
16.90	19.90	3.00	2.82	SILICEOUS IRON ORE	DARK GREY	34.83	47.43	1.98	
19.90	23.00	3.10	2.91	SILICEOUS IRON ORE	DARK GREY	30.37	53.59	1.18	
23.00	24.70	1.70	1.60	SILICEOUS IRON ORE	DARK GREY	33.25	50.30	0.79	
24.70	28.40	3.70	3.48	SILICEOUS IRON ORE	DARK GREY	33.05	50.34	1.28	
28.40	29.15	0.75	0.71	SILICEOUS IRON ORE	DARK GREY	23.30	64.51	0.61	
29.15	31.40	2.25	2.12	SILICEOUS IRON ORE	DARK GREY	31.08	53.71	0.76	
31.40	32.15	0.75	0.71	SILICEOUS IRON ORE	DARK GREY	62.21	6.01	1.13	
32.15	33.00	0.85	0.80	SILICEOUS IRON ORE	DARK GREY	32.06	53.35	0.62	
33.00	34.50	1.50	1.41	SILICEOUS IRON ORE	DARK GREY	34.50	49.20	0.76	
34.50	36.50	2.00	1.88	SILICEOUS IRON ORE	DARK GREY	34.04	49.47	1.10	
36.50	38.20	1.70	1.60	SILICEOUS IRON ORE	DARK GREY	36.21	46.77	0.87	
38.20	39.50	1.30	1.22	SILICEOUS IRON ORE	DARK GREY	33.43	49.86	1.15	
39.50	41.10	1.60	1.50	SILICEOUS IRON ORE	DARK GREY	48.12	29.99	0.88	

-

BOREHOLE NO:MKD-18

DEPTH (M)		THICK-NESS (m)	TRUE THICK-NESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
FROM	TO								
41.10	42.40	1.30	1.22	SILICEOUS IRON ORE	DARK GREY	42.16	38.35	1.05	
42.40	44.45	2.05	1.93	SILICEOUS IRON ORE	DARK GREY	33.72	50.77	0.80	
44.45	45.30	0.85	0.80	SILICEOUS IRON ORE	DARK GREY	38.40	44.00	0.64	
45.30	46.95	1.65	1.55	SILICEOUS IRON ORE	DARK GREY	37.26	45.45	0.85	
46.95	48.45	1.50	1.41	SILICEOUS IRON ORE	DARK GREY	40.84	40.03	0.71	
48.45	50.00	1.55	1.46	SILICEOUS IRON ORE	DARK GREY	39.47	42.72	0.66	
50.00	51.50	1.50	1.41	SILICEOUS IRON ORE	DARK GREY	34.47	49.01	0.52	
51.50	53.00	1.50	1.41	SILICEOUS IRON ORE	DARK GREY	36.13	47.22	0.68	

ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)
M/s. KANHAIYALAL DUDHERIA MINE LEASE AREA (ML No. 2563), DIST: BALLARI, KARNATAKA

BOREHOLE NO:MKD-19

LATITUDE : 1677924.715
LONGITUDE : 653733.017
REDUCED LEVEL (M): 881.658

DATE OF COMMENCEMENT : 23/02/16
DATE OF CLOSURE : 26/02/16
DEPTH DRILLED (M) : 58.20

DEPTH (M) FROM	DEPTH (M) TO	THICKNESS (m)	TRUE THICKNESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
0.00	1.00	1.00	0.94	HAEMATITIC ORE	DARK GREY	60.48	6.40	3.15	
1.00	1.70	0.70	0.66	HAEMATITIC ORE	DARK GREY	64.89	4.40	2.38	
1.70	2.40	0.70	0.66	HAEMATITIC ORE	DARK GREY	61.35	5.56	6.41	
2.40	3.30	0.90	0.85	HAEMATITIC ORE	DARK GREY	66.42	2.92	1.91	
3.30	4.30	1.00	0.94	HAEMATITIC ORE	DARK GREY	63.74	5.60	3.07	
4.30	5.00	0.70	0.66	HAEMATITIC ORE	DARK GREY	66.46	2.24	1.63	
5.00	5.70	0.70	0.66	HAEMATITIC ORE	DARK GREY	64.26	3.84	3.87	
5.70	6.70	1.00	0.94	HAEMATITIC ORE	DARK GREY	64.50	3.72	2.83	
6.70	7.86	1.16	1.09	HAEMATITIC ORE	DARK GREY	67.45	2.20	1.19	
7.86	8.50	0.64	0.60	HAEMATITIC ORE	DARK GREY	64.86	3.93	1.49	
8.50	9.30	0.80	0.75	HAEMATITIC ORE	DARK GREY	66.59	3.20	1.09	
9.30	10.20	0.90	0.85	HAEMATITIC ORE	DARK BROWN	64.25	4.65	2.48	
10.20	11.20	1.00	0.94	HAEMATITIC ORE	STEEL GREY	56.93	7.61	5.03	
11.20	11.83	0.63	0.59	POWDERY ORE	DARK GREY	63.59	4.78	3.30	
11.83	12.50	0.67	0.63	POWDERY ORE	DARK GREY	63.51	6.20	1.23	
12.50	13.70	1.20	1.13	POWDERY ORE	DARK GREY	57.57	13.19	1.04	
13.70	14.30	0.60	0.56	POWDERY ORE	DARK GREY	56.60	15.40	1.43	
14.30	14.70	0.40	0.38	POWDERY ORE	DARK GREY	60.15	9.94	1.76	
14.70	15.50	0.80	0.75	POWDERY ORE	DARK GREY	53.83	21.07	1.32	
15.50	16.60	1.10	1.03	POWDERY ORE	LIGHT GREY	50.84	20.83	6.28	
16.60	17.20	0.60	0.56	HAEMATITIC ORE	LIGHT GREY	56.20	17.28	0.92	
17.20	18.20	1.00	0.94	HAEMATITIC ORE	LIGHT GREY	44.11	34.41	0.52	
18.20	19.20	1.00	0.94	HAEMATITIC ORE	LIGHT GREY	45.75	26.23	2.67	
19.20	20.20	1.00	0.94	HAEMATITIC ORE	LIGHT GREY	43.18	30.01	0.80	
20.20	20.65	0.45	0.42	HAEMATITIC ORE	LIGHT GREY	45.65	28.32	0.91	
20.65	21.20	0.55	0.52	HAEMATITIC ORE	DARK GREY	41.85	38.84	0.86	
21.20	21.70	0.50	0.47	HAEMATITIC ORE	DARK GREY	44.87	32.11	0.47	
21.70	22.30	0.60	0.56	HAEMATITIC ORE	DARK GREY	50.95	23.72	1.27	
22.30	23.05	0.75	0.71	SOFT LAMINATED ORE	DARK GREY	53.20	16.58	6.21	

-

BOREHOLE NO:MKD-19

DEPTH (M)		THICK-NESS (m)	TRUE THICK-NESS (m)	LITHOLOGY	COLOR DETAILS	Fe %	SiO_2 %	Al_2O_3 %	REMARKS
FROM	TO								
23.05	23.80	0.75	0.71	SOFT LAMINATED ORE	DARK GREY	54.16	19.66	2.78	
23.80	24.30	0.50	0.47	SOFT LAMINATED ORE	DARK GREY	46.18	28.92	1.37	
24.30	25.05	0.75	0.71	SOFT LAMINATED ORE	DARK GREY	45.81	31.31	0.96	
25.05	25.80	0.75	0.71	SOFT LAMINATED ORE	LIGHT GREY	42.64	32.12	1.38	
25.80	27.30	1.50	1.41	POWDERY ORE	LIGHT GREY	49.85	25.23	2.02	
27.30	28.90	1.60	1.50	POWDERY ORE	LIGHT GREY	45.45	28.93	1.96	
28.90	30.05	1.15	1.08	POWDERY ORE	LIGHT GREY	50.02	24.54	2.28	
30.05	31.25	1.20	1.13	POWDERY ORE	LIGHT GREY	44.05	31.40	2.23	
31.25	31.90	0.65	0.61	SILICEOUS IRON ORE	LIGHT GREY	38.26	36.36	1.25	
31.90	33.00	1.10	1.03	SILICEOUS IRON ORE	LIGHT GREY	37.20	45.61	1.10	
33.00	33.85	0.85	0.80	SILICEOUS IRON ORE	LIGHT GREY	33.54	49.50	0.83	
33.85	35.75	1.90	1.79	SILICEOUS IRON ORE	DARK GREY	37.66	44.65	1.03	
35.75	37.75	2.00	1.88	SILICEOUS IRON ORE	DARK GREY	39.11	42.53	1.23	
37.75	38.55	0.80	0.75	SILICEOUS IRON ORE	DARK GREY	36.97	44.91	1.42	
38.55	40.50	1.95	1.83	SILICEOUS IRON ORE	DARK GREY	37.00	45.09	1.70	
40.50	43.40	2.90	2.73	SILICEOUS IRON ORE	DARK GREY	37.00	45.28	1.38	
43.40	47.00	3.60	3.38	SILICEOUS IRON ORE	DARK GREY	42.64	33.94	1.26	
47.00	48.90	1.90	1.79	SILICEOUS IRON ORE	DARK GREY	39.49	41.88	1.39	
48.90	49.95	1.05	0.99	SILICEOUS IRON ORE	DARK GREY	38.28	42.88	2.16	
49.95	50.60	0.65	0.61	SILICEOUS IRON ORE	DARK GREY	39.54	34.19	6.43	
50.60	53.05	2.45	2.30	SILICEOUS IRON ORE	DARK GREY	38.45	42.73	1.59	
53.05	55.80	2.75	2.59	SILICEOUS IRON ORE	DARK GREY	40.13	41.00	1.18	
55.80	58.20	2.40	2.26	SILICEOUS IRON ORE	DARK GREY	39.12	42.10	1.47	

Annexure 6

THE FEASIBILITY REPORT OF MINING OPERATION AT RAMDEV IRON ORE MINE (ML NO 2563) IS FURNISHED AS UNDER

1. GENERAL MINE DESCRIPTION:

Ramdev Iron ore Mine (ML No 2563) with an area of 30.09 Ha (as per CEC survey) is falls in Survey of India toposheet No D43E8 (57 A/8). Latitude & Longitudes are in datum Indian Bangladesh & WGS 84.

Sl.No	ML corner boundary point point	Latitude	Longitude
1	LBC-01	N 15° 10'07.86447"	E 76° 25' 58.46160"
2	LBC-1A	N 15° 10'13.31131"	E 76° 25' 53.38919"
3	LBC-1B	N 15° 10'21.34239 "	E 76° 25' 45.93156"
4	LBC-02	N 15° 10' 30.90740 "	E76°25'36.84620"
5	LBC-03	N 15° 10'37.35727 "	E 76° 25'44.73267"
6	LBC-3A	N 15° 10'27.66010 "	E 76° 25'54.20360"
7	LBC-04	N 15° 10'19.82714 "	E76°26'01.85564"
8	LBC-05	N 15° 10'14.06780 "	E 76° 26'06.29030 "

Regional Geology :

The Ballari–Hospet region forms a part of the „Sandur Schist Belt". The rock formation belonging to Iron ore stage of Dharwar super group of Precambrian schistose rock. The lithological units include green stones, which are the metamorphosed basic igneous rocks occupying the valley regions, with Phyllite-quartzite"s forming the canoe-shaped amphitheater of hills, trending NNW-SSE and enclosing Sandur. The Phyllites are locally Shaly and the Quartzite"s are of the nature of Banded Hematite Jaspers, and Banded Hematite Quartzites, inter banded with each other.

The Banded Hematite Jaspers, the important source rocks for the iron ore in the area are prominent in the Northern and Western part of the ranges, whereas the associated Shales become prominent in the Southern and

Eastern parts of the area. The iron ore form a capping over the quartzites and Shales and overlie a sequence of Manganiferous Phyllitic rocks. Lateritisation is widespread in most of the flat topped ridges.

Structurally, the Sandur hills form a tightly folded synclinorium, plunging gently to NNW and the hill ranges broadly delineate the folded limbs of synclines, with close repetition of strata due to minor folds. The strike of the ore bodies is generally parallel to the trend of the hill ranges and dips are often steep, being vertical at number of places. Opposing dips towards NE and SW are found in the Ramandurg and NEB ranges. The iron ore deposits of NEB range forms a part of the Bellary-Hospet group of iron ore deposits and occupy the Northern tip of Sandur Synclonorium. These deposits lie on the Northern flanks of Sandur basin.

Geology of the Mine:

Geologically the iron ore deposit at Ramdev Iron Ore Mine belongs to Donimalai formation. General strike of the formation is N35ºW-S35ºE and dipping at 60º to 70º easterly. The total strike length of the ore deposit is around 773m with an average width of about 120m. The iron ore formation found here is a part of Ramandurg Range of this sector (*i.e.* Hospet-Bellary- Sandur). The iron ore deposit pinches towards north-west side near section C-C". The rock formations in the mine lease area are as follows:

i) Soil
ii) BHQ
iii) BIF (Banded Iron Formations)
iv) Shale

The deposit occurs as a reef (at 45% Fe cut-off). Although there are no structural disturbances observed in the lease area, the recovery of iron ore is 90%. Balance 10% constitutes intercalated waste such as shales/phyllite, BHQ etc.

2. EXPLORATION:

Exploration carried out by MECL:

The drilling was taken up to estimate the iron ore reserves, MECL conducted Diamond Core drilling and RC drilling involving 233.30 m (4 Bhs core) and 1045.00 (15 Bhs RC). Total 1278.3m (19 Bhs), 1191 Nos samples were analysed.

The summary of diamond Core drilling boreholes and RC drilling boreholes that have been drilled in grid pattern 100 m X 100 m MECL so far is tabulated below.

Year	No of Boreholes		Meterage drilled		Total	
	Core drilling	RC drilling	Core drilling	RC drilling	No of holes	Meterage
2015-16 (February to March)	04	15	233.30	1045.00	19	1278.3

Source: MECL exploration data as provided along with the tender document during e-auction process.

3. RESERVE ASSESSMENT:

1) Geological & Net Geological Reserve have been estimated by MECL, bulk density of 3.5 t / Cu.m considered for calculation purpose. Mineable reserves have not been estimated.

2) As bulk density assumed in the estimation of reserves is high, considering the nature of the ore characteristics the bulk density considered as 3.5 t/ cu.m and 95% recovery of the net geological reserves as mineable by ICFRE, the details of reserves is as tabulated below.

(Quantity in Million Tones)

Category	UNFC Code	Geological Reserves (MECL)	Net Geological Reserves (90% Geological Reserves by MECL)	Mineable reserves at 95% recovery
Proved	111	8.11	7.30	6.34
Probable	122	1.89	1.70	1.48
Possible	333	0.29	0.26	0.23
	Total	10.29	9.26	8.05
	Grade		Wt. Avg. 50.89%	

3) Based on the MECL data MSPL Limited has been reclassified the estimated of reserves by considering the MECL sections the area where the bore holes are drilled at 100 m interval, the reserves are categorized as proved reserves (111) to the lowest depth, beyond that lowest depth the reserves are categorized as probable reserves (121 & 122). Some reserves are beyond ultimate pit limit and are categorized as measured mineral resources (211). Some of the reserves beyond the ultimate pit limit and beyond the proved depth area categorized as Inferred Mineral reserves (333) .The reserves / resources calculation by cross section method, category wise are reclassified as on 01-06-2019 (under UNFC Category).

	UNFC Code	Quantity in million tons	Grade %Fe
A. Total Mineral Reserve			At 45% Fe Cut-off
Proved Mineral Reserve	111	4.17	
Probable Mineral Reserve	121 and 122	2.83	
	Sub Total	**7.00**	
B. Total Remaining Resources			
Feasibility Mineral Resource	211	1.18	
Prefeasibility Mineral Resource	221 and 222	-	
Measured Mineral Resource	331	-	
Indicated Mineral Resource	332	-	
Inferred Mineral Resource	333	1.08	
Reconnaissance Mineral Resource	334	-	
	Sub Total	**2.26**	
Total Reserve (111) + Resources(211+333)		7.00+2.26**= 9.26**	

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.

Hematitic Siliceous Ore are characterising by alternate bands of hematite and siliceous material, BHQ are originated in mid-oceanic condition/transition zones, by volcanic eruption process, it indicates it is a hard rock/BHQ.

As per the prepared borehole data, longitudinal & vertical sections and analysis report the depth persistent of lithologies are varies. The deeper boreholes cross sections analysis indicates the percentage of silica content

is increasing and hardness of BHQ rock is also increased.

After plotting the ore body in LV section, it indicates depth persistent of litho-logs varies, due to considering these geological, lithological & analytical results. Based on the geological setup of ore body the Iron Ore analysis +35%Fe to 45%Fe is meagerly and not consistent so that we have not assessed / calculated Heamatatic Siliceous Ore. If at all while mining producing of +35%Fe to 45%Fe will be stock in separately.

Entire lease area has been explored fully. All the samples were analyzed Wt.Avg. 50.89 % Fe. There is no sub grade mineral.

4. PRODUCTION SCHEDULE:

The updated category wise reserves is 7.00 MMT. However at the present rate of production capacity 0.23 MTPA, the life of the mine will be 31 years. Whereas LOI issued has been for period of 50 years.

5. MINING METHOD:

The existing geometry of the benches are irregular, it is proposed to work fully mechanized and maintain the height of the bench is 10 m and width of bench will be more than 10 m except S11 to S14. In S11 to S14 it is proposed the bench width will be 8 m to exhaust the iron ore. The road gradient maintained at 1:16. Pit slope angle will be at 36° to 45° and bench slope angle will be 70°- 80°. It will be maintained as per statutory requirement, the benches are being providing with connecting ramps which is having the gradient 1:16 with hair pin curves and in cases where the bench to bench connection at the bottom/face, the gradient is 1:10 will be mentioned for a distance of not exceeding 100 m as per the statutory requirements.
The present RL minimum m RL is 820 and maximum m RL is 920, The advance of benches will be extended towards north west to south east making pits during the first five year period.

It is proposed to work between coordinates E 653300 to 654100 N 1677700 to 1678400 for five year plan period.

Ramdev Iron Ore Mine is being operated by open cast mining method with high mechanization comprising of hydraulic excavators and dumpers combinations. There is no change in proposal method of excavation.

For the conceptual period it is proposed the height and width of the benches are about 8-9 m, with haul road width more than 10 m with

gradient maintained at 1:16. Pit slope angle is maintained at 36° to 55° and bench slopes are 70° 80°.To win the blocked ore 1.18 MMT under 211 category additional area is required, accordingly we are requesting the state government in future.

Estimation of ore and waste is calculated up to the life of the mine. The ore to overburden volumetric ratio is 1:1.03. Processed ore will be dispatched to MSPL Pellet Plant for its captive use.

6. BENEFICIATION:

Processing of ROM: Mobile crushing and screening plant (150 TPH)

ROM comes to the crushing & screening plant through the trucks and gets delivered to grizzly. Oversize of grizzly flows directly to one number jaw crusher. Jaw crusher product passes through one triple deck screen (40, 20, 10 mm opening), with the lowest deck as 10 mm. -10 mm material from this screen is diverted to product stockpile, whereas the -20+10mm goes to one number tertiary crusher. +20 mm material goes to one number secondary crusher. The product of secondary crusher goes to same triple deck screen and follows path as described above.

Product of tertiary crusher goes to one vibrating screening of 10 mm. -10 mm material reports to the product stockpile, whereas +10mm material goes back to tertiary crusher. Thus product of 100% -10mm is produced out of the crushing and screening plant. The product which is coming out from crushers will be loaded to the Tippers / Dumpers and it will be transported and unloaded in to the designated stock piles. The external tippers will utilised for the dispatch of products from stock piles/Crushers.

There is no beatification process at mine site.

7. MARKETING:

The total ROM ore produced from this mine will be crushed and screened the ore will be dispatched to MSPL Pellet Plant for its captive use. Physical specification of ore is 100% -10 mm, the chemical composition of processed ore at 45% Fe cut-off grade with Wt. Avg. 51.68% Fe for the five plan period.

The present sale prize for calibrated ore below 55% Fe is Rs 1463/- per ton and fines Rs. 1079/- per ton on the basis of information of IBM for the month of May 2019.

8. INFRASTRUCTURE:

The mining lease is located in Ramgad Reserve forest, Sandur taluk, Ballari district, Karnataka state.

Major site services are proposed at the mine for workshop, store, electric sub station, first aid room, water quality, canteen, mine office, HSD layout, computer section. The manpower employed at Ramdev Iron ore Mine for mining and related operations is 65 (Highly Skilled - 15, Skilled-20, Semi-Skilled -20, Un-Skilled- 10) and 19 statutory requirement.

9. ENVIRONMENTAL REQUIREMENTS:

The Mine has environmental clearance. The Mining Plan (including Progressive mine closure plan) to be obtained from Indian Bureau of Mines, Bengaluru, and consent for operation from SPCB. The final mine closure plan will be submitted at the time of final closure. The reclamation and rehabilitation plans were prepared by ICFRE and approved by CEC. The annual capacity of the production is 0.23 MTPA fixed by CEC.

10. OTHERS LIKE LEGAL FACTORS LIKE TRIBAL ISSUES, NATIONAL PARKS ETC.,:

Nil.

11. ECONOMIC EVALUATION:

Budget for Proposed Mining				
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)
Capital Investment				1842.95
I	**Land**			506.89
a	Land cost expenditure	Rs 15.60 Lakh / Ha. For forest land	Area: 32.49 Ha. Forest land (ML area & road)	506.89
b	Cost on relief and rehabilitation action plan		Rehabilitation not required	0.00
c.	compensation to the land outstees		No land outstees	0.00

d.	Cost of acquiring surface Rights		Not required as it is Forest land	0.00
II.	**Mining**			996.00
a.	Cost of Infrastructure & equipments		Mechanized mining	996.00
III.	**Environmental protection**			285.06
a.	Pollution Control (check dam, gully plug, settling tanks, water tanker, etc.)			
	Garland Drain			285.06
	Retaining Walls			
	Settling ponds			
	Plantation, Terrecing			
	Water Tanker			
	Bund with stone boulders			
	Masonary check dam			
	Gully plugs			
	Reclaming area under encroachment			
IV.	**Socio-economic development**			50
a.	Infrastructure development (Edu, Medical, etc)			
i.	Educational facilities	Free Scholarship for higher education in the buffer zone		15
ii.	Medical facilities	Health check up of villagers villages in buffer zone & workers		10
iii.	Others			5
b.	Income Generation Activities	Financial support for interest free loans	Financial Support to SHG	20

V.	**Occupational Health & Safety**			5
a.	Infrastructure & PPEs			5
VI	**Payment to Govenment-Auction Charges**			1533.90
a	Stamp duty for Registrtion of MDPA			709.43
b	Payments regarding Exploration,DGPS survey & RR preparation,etc			372.74
c	Upfront Paymnet including all installments			451.73
	Total Capital Investment			3376.85
			Say Rs. 3377 lakhs	

Budget for Proposed Mining					
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)	Cost per tonne in Rs.
Recurring Expenditure				1,226.56	533.29
i	**Mining**				
a.	Expenditure for infrastructure and equipment maintenance		15 % of direct investment for infrastructure & maintenance	149.40	64.96
b.	Mining of ore and waste	Rs. Per ton	Rs. 190 / ton	437.00	190.00
c.	Salaries & Wages of 62 staffs	No of workers X Wages	Rs. 1,40,777/- per Annum	87.28	37.95
d.	Royalty on mineral & miscellaneous	Rs. Per ton	Royalty 15% on Sale Price, NMET -2% on Royalty	379.70	165.09
ii.	**Socio-economic development -DMF-10% on royalty**			37.23	16.19
a.	Crop Damage Compensation				0.00
b.	Corporate Social Responsibility	Payment to SPV -10% on sale Value /DMF 10% on Royalty			0.00

c.	Income Generation Activities				0.00
d.	Community Health checkup				0.00
iii.	**Occupational Health & Safety**				0.00
a.	For routine checkup	62 persons X per annum	Budget Rs.2000/- per annum per employee	1.24	0.54
b.	Medical aid as under ESI scheme		Rs.2544/- per annum per employee	1.58	0.69
c.	Budget for training		per year	10.00	4.35
d.	Compensation for accident and injuries	Rs. 100,000 X Anticipated rate of injuries (No of workers)	Anticipated rate of Injury : 1%	0.62	0.27
iv.	**Environment Management**				0.00
a.	Maintenance of Pollution control Facilities		30 % Capital Investment	85.52	37.18
b.	Dust Suppression & Pollution Control			12.00	5.22
c.	Environmental Monitoring			15.00	6.52
d.	Environmental division			10.00	4.35
	Total Recurring Expenditure			1,226.56	533.29
				Say Rs. 533 / -	

Capital investment including Pre -emptive expences:		1842.95	Lakhs
Capital investment for Mining and Environmental Management:		1336.06	Lakhs
(Environmental controle,social development etc)			
Consideration of per tonne Working cost as on date is given below			
Recurring cost (Rs/MT)		Rs/tonne	
Expenditure on cost of Mining		292.91	
Expenditure for Socio-economic development		16.19	
Expenditure for Occupational Health and safety		5.84	
Expenditure for Environmental Management		53.27	
Expenditute on royalty ,DMF,NMET		165.09	
Total		533.29	
Value of Mineral at pit head	Rs/tonne	1079.00	
Lessee has to pay 111% on sale price as auction money	Rs/tonne	1197.69	
Summary of Viability:			
Expenditure calculated at Working cost Rs 533/- per tonne and Revenue at Rs 1079 /-per tonne,IRR found for 20 years is 20%. Hence this project is viable.			
Considerations:			
1.Sale price of Iron ore lumps & fines considered as per the IBM inputs, May '2019 data			
2. Below 55% fe lumps cost- Rs 1463/- per tonne			1463
3. 55% fe Fines cost-Rs 1079/- per tonne			1079
4. Considered dispatch of 100% fines for our capitive plant			

S. SHIVAKUMAR
M.Sc.Geology
AGM (Exploration)

Annexure 6

THE FEASIBILITY REPORT OF MINING OPERATION AT RAMDEV IRON ORE MINE (ML NO 2563) IS FURNISHED AS UNDER

1. GENERAL MINE DESCRIPTION:

Ramdev Iron ore Mine (ML No 2563) with an area of 30.09 Ha (as per CEC survey) is falls in Survey of India toposheet No D43E8 (57 A/8). Latitude & Longitudes are in datum Indian Bangladesh & WGS 84.

Sl.No	ML corner boundary point point	Latitude	Longitude
1	LBC-01	N 15° 10'07.86447"	E 76° 25' 58.46160"
2	LBC-1A	N 15° 10'13.31131"	E 76° 25' 53.38919"
3	LBC-1B	N 15° 10'21.34239 "	E 76° 25' 45.93156"
4	LBC-02	N 15° 10' 30.90740 "	E76°25'36.84620"
5	LBC-03	N 15° 10'37.35727 "	E 76° 25'44.73267"
6	LBC-3A	N 15° 10'27.66010 "	E 76° 25'54.20360"
7	LBC-04	N 15° 10'19.82714 "	E76°26'01.85564"
8	LBC-05	N 15° 10'14.06780 "	E 76° 26'06.29030 "

Regional Geology :

The Ballari–Hospet region forms a part of the „Sandur Schist Belt". The rock formation belonging to Iron ore stage of Dharwar super group of Precambrian schistose rock. The lithological units include green stones, which are the metamorphosed basic igneous rocks occupying the valley regions, with Phyllite-quartzite"s forming the canoe-shaped amphitheater of hills, trending NNW-SSE and enclosing Sandur. The Phyllites are locally Shaly and the Quartzite"s are of the nature of Banded Hematite Jaspers, and Banded Hematite Quartzites, inter banded with each other.

The Banded Hematite Jaspers, the important source rocks for the iron ore in the area are prominent in the Northern and Western part of the ranges, whereas the associated Shales become prominent in the Southern and

Eastern parts of the area. The iron ore form a capping over the quartzites and Shales and overlie a sequence of Manganiferous Phyllitic rocks. Lateritisation is widespread in most of the flat topped ridges.

Structurally, the Sandur hills form a tightly folded synclinorium, plunging gently to NNW and the hill ranges broadly delineate the folded limbs of synclines, with close repetition of strata due to minor folds. The strike of the ore bodies is generally parallel to the trend of the hill ranges and dips are often steep, being vertical at number of places. Opposing dips towards NE and SW are found in the Ramandurg and NEB ranges. The iron ore deposits of NEB range forms a part of the Bellary-Hospet group of iron ore deposits and occupy the Northern tip of Sandur Synclonorium. These deposits lie on the Northern flanks of Sandur basin.

Geology of the Mine:

Geologically the iron ore deposit at Ramdev Iron Ore Mine belongs to Donimalai formation. General strike of the formation is N35ºW-S35ºE and dipping at 60º to 70º easterly. The total strike length of the ore deposit is around 773m with an average width of about 120m. The iron ore formation found here is a part of Ramandurg Range of this sector (*i.e.* Hospet-Bellary- Sandur). The iron ore deposit pinches towards north-west side near section C-C". The rock formations in the mine lease area are as follows:

i) Soil
ii) BHQ
iii) BIF (Banded Iron Formations)
iv) Shale

The deposit occurs as a reef (at 45% Fe cut-off). Although there are no structural disturbances observed in the lease area, the recovery of iron ore is 90%. Balance 10% constitutes intercalated waste such as shales/phyllite, BHQ etc.

2. EXPLORATION:

Exploration carried out by MECL:

The drilling was taken up to estimate the iron ore reserves, MECL conducted Diamond Core drilling and RC drilling involving 233.30 m (4 Bhs core) and 1045.00 (15 Bhs RC). Total 1278.3m (19 Bhs), 1191 Nos samples were analysed.

The summary of diamond Core drilling boreholes and RC drilling boreholes that have been drilled in grid pattern 100 m X 100 m MECL so far is tabulated below.

Year	No of Boreholes		Meterage drilled		Total	
	Core drilling	RC drilling	Core drilling	RC drilling	No of holes	Meterage
2015-16 (February to March)	04	15	233.30	1045.00	19	1278.3

Source: MECL exploration data as provided along with the tender document during e-auction process.

3. RESERVE ASSESSMENT:

1) Geological & Net Geological Reserve have been estimated by MECL, bulk density of 3.5 t / Cu.m considered for calculation purpose. Mineable reserves have not been estimated.

2) As bulk density assumed in the estimation of reserves is high, considering the nature of the ore characteristics the bulk density considered as 3.5 t/ cu.m and 95% recovery of the net geological reserves as mineable by ICFRE, the details of reserves is as tabulated below.

(Quantity in Million Tones)

Category	UNFC Code	Geological Reserves (MECL)	Net Geological Reserves (90% Geological Reserves by MECL)	Mineable reserves at 95% recovery
Proved	111	8.11	7.30	6.34
Probable	122	1.89	1.70	1.48
Possible	333	0.29	0.26	0.23
	Total	10.29	9.26	8.05
	Grade		Wt. Avg. 50.89%	

3) Based on the MECL data MSPL Limited has been reclassified the estimated of reserves by considering the MECL sections the area where the bore holes are drilled at 100 m interval, the reserves are categorized as proved reserves (111) to the lowest depth, beyond that lowest depth the reserves are categorized as probable reserves (121 & 122). Some reserves are beyond ultimate pit limit and are categorized as measured mineral resources (211). Some of the reserves beyond the ultimate pit limit and beyond the proved depth area categorized as Inferred Mineral reserves (333) .The reserves / resources calculation by cross section method, category wise are reclassified as on 01-06-2019 (under UNFC Category).

	UNFC Code	Quantity in million tons	Grade %Fe
A. Total Mineral Reserve			At 45% Fe Cut-off
Proved Mineral Reserve	111	4.17	
Probable Mineral Reserve	121 and 122	2.83	
	Sub Total	**7.00**	
B. Total Remaining Resources			
Feasibility Mineral Resource	211	1.18	
Prefeasibility Mineral Resource	221 and 222	-	
Measured Mineral Resource	331	-	
Indicated Mineral Resource	332	-	
Inferred Mineral Resource	333	1.08	
Reconnaissance Mineral Resource	334	-	
	Sub Total	**2.26**	
Total Reserve (111) + Resources(211+333)		7.00+2.26**= 9.26**	

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.

Hematitic Siliceous Ore are characterising by alternate bands of hematite and siliceous material, BHQ are originated in mid-oceanic condition/transition zones, by volcanic eruption process, it indicates it is a hard rock/BHQ.

As per the prepared borehole data, longitudinal & vertical sections and analysis report the depth persistent of lithologies are varies. The deeper boreholes cross sections analysis indicates the percentage of silica content

is increasing and hardness of BHQ rock is also increased.

After plotting the ore body in LV section, it indicates depth persistent of litho-logs varies, due to considering these geological, lithological & analytical results. Based on the geological setup of ore body the Iron Ore analysis +35%Fe to 45%Fe is meagerly and not consistent so that we have not assessed / calculated Heamatatic Siliceous Ore. If at all while mining producing of +35%Fe to 45%Fe will be stock in separately.

Entire lease area has been explored fully. All the samples were analyzed Wt.Avg. 50.89 % Fe. There is no sub grade mineral.

4. PRODUCTION SCHEDULE:

The updated category wise reserves is 7.00 MMT. However at the present rate of production capacity 0.23 MTPA, the life of the mine will be 31 years. Whereas LOI issued has been for period of 50 years.

5. MINING METHOD:

The existing geometry of the benches are irregular, it is proposed to work fully mechanized and maintain the height of the bench is 10 m and width of bench will be more than 10 m except S11 to S14. In S11 to S14 it is proposed the bench width will be 8 m to exhaust the iron ore. The road gradient maintained at 1:16. Pit slope angle will be at 36° to 45° and bench slope angle will be 70°- 80°. It will be maintained as per statutory requirement, the benches are being providing with connecting ramps which is having the gradient 1:16 with hair pin curves and in cases where the bench to bench connection at the bottom/face, the gradient is 1:10 will be mentioned for a distance of not exceeding 100 m as per the statutory requirements.
The present RL minimum m RL is 820 and maximum m RL is 920, The advance of benches will be extended towards north west to south east making pits during the first five year period.

It is proposed to work between coordinates E 653300 to 654100 N 1677700 to 1678400 for five year plan period.

Ramdev Iron Ore Mine is being operated by open cast mining method with high mechanization comprising of hydraulic excavators and dumpers combinations. There is no change in proposal method of excavation.

For the conceptual period it is proposed the height and width of the benches are about 8-9 m, with haul road width more than 10 m with

gradient maintained at 1:16. Pit slope angle is maintained at 36° to 55° and bench slopes are 70° 80°.To win the blocked ore 1.18 MMT under 211 category additional area is required, accordingly we are requesting the state government in future.

Estimation of ore and waste is calculated up to the life of the mine. The ore to overburden volumetric ratio is 1:1.03. Processed ore will be dispatched to MSPL Pellet Plant for its captive use.

6. BENEFICIATION:

Processing of ROM: Mobile crushing and screening plant (150 TPH)

ROM comes to the crushing & screening plant through the trucks and gets delivered to grizzly. Oversize of grizzly flows directly to one number jaw crusher. Jaw crusher product passes through one triple deck screen (40, 20, 10 mm opening), with the lowest deck as 10 mm. -10 mm material from this screen is diverted to product stockpile, whereas the -20+10mm goes to one number tertiary crusher. +20 mm material goes to one number secondary crusher. The product of secondary crusher goes to same triple deck screen and follows path as described above.

Product of tertiary crusher goes to one vibrating screening of 10 mm. -10 mm material reports to the product stockpile, whereas +10mm material goes back to tertiary crusher. Thus product of 100% -10mm is produced out of the crushing and screening plant. The product which is coming out from crushers will be loaded to the Tippers / Dumpers and it will be transported and unloaded in to the designated stock piles. The external tippers will utilised for the dispatch of products from stock piles/Crushers.

There is no beatification process at mine site.

7. MARKETING:

The total ROM ore produced from this mine will be crushed and screened the ore will be dispatched to MSPL Pellet Plant for its captive use. Physical specification of ore is 100% -10 mm, the chemical composition of processed ore at 45% Fe cut-off grade with Wt. Avg. 51.68% Fe for the five plan period.

The present sale prize for calibrated ore below 55% Fe is Rs 1463/- per ton and fines Rs. 1079/- per ton on the basis of information of IBM for the month of May 2019.

8. INFRASTRUCTURE:

The mining lease is located in Ramgad Reserve forest, Sandur taluk, Ballari district, Karnataka state.

Major site services are proposed at the mine for workshop, store, electric sub station, first aid room, water quality, canteen, mine office, HSD layout, computer section. The manpower employed at Ramdev Iron ore Mine for mining and related operations is 65 (Highly Skilled - 15, Skilled-20, Semi-Skilled -20, Un-Skilled- 10) and 19 statutory requirement.

9. ENVIRONMENTAL REQUIREMENTS:

The Mine has environmental clearance. The Mining Plan (including Progressive mine closure plan) to be obtained from Indian Bureau of Mines, Bengaluru, and consent for operation from SPCB. The final mine closure plan will be submitted at the time of final closure. The reclamation and rehabilitation plans were prepared by ICFRE and approved by CEC. The annual capacity of the production is 0.23 MTPA fixed by CEC.

10. OTHERS LIKE LEGAL FACTORS LIKE TRIBAL ISSUES, NATIONAL PARKS ETC.,:

Nil.

11. ECONOMIC EVALUATION:

Budget for Proposed Mining				
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)
Capital Investment				1842.95
I	**Land**			506.89
a	Land cost expenditure	Rs 15.60 Lakh / Ha. For forest land	Area: 32.49 Ha. Forest land (ML area & road)	506.89
b	Cost on relief and rehabilitation action plan		Rehabilitation not required	0.00
c.	compensation to the land outstees		No land outstees	0.00

d.	Cost of acquiring surface Rights		Not required as it is Forest land	0.00
II.	**Mining**			996.00
a.	Cost of Infrastructure & equipments		Mechanized mining	996.00
III.	**Environmental protection**			285.06
a.	Pollution Control (check dam, gully plug, settling tanks, water tanker, etc.)			
	Garland Drain			285.06
	Retaining Walls			
	Settling ponds			
	Plantation, Terrecing			
	Water Tanker			
	Bund with stone boulders			
	Masonary check dam			
	Gully plugs			
	Reclaming area under encroachment			
IV.	**Socio-economic development**			50
a.	Infrastructure development (Edu, Medical, etc)			
i.	Educational facilities	Free Scholarship for higher education in the buffer zone		15
ii.	Medical facilities	Health check up of villagers villages in buffer zone & workers		10
iii.	Others			5
b.	Income Generation Activities	Financial support for interest free loans	Financial Support to SHG	20

V.	**Occupational Health & Safety**			5
a.	Infrastructure & PPEs			5
VI	**Payment to Govenment-Auction Charges**			1533.90
a	Stamp duty for Registrtion of MDPA			709.43
b	Payments regarding Exploration,DGPS survey & RR preparation,etc			372.74
c	Upfront Paymnet including all installments			451.73
	Total Capital Investment			3376.85
			Say Rs. 3377 lakhs	

Budget for Proposed Mining					
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)	Cost per tonne in Rs.
Recurring Expenditure				1,226.56	533.29
i	**Mining**				
a.	Expenditure for infrastructure and equipment maintenance		15 % of direct investment for infrastructure & maintenance	149.40	64.96
b.	Mining of ore and waste	Rs. Per ton	Rs. 190 / ton	437.00	190.00
c.	Salaries & Wages of 62 staffs	No of workers X Wages	Rs. 1,40,777/- per Annum	87.28	37.95
d.	Royalty on mineral & miscellaneous	Rs. Per ton	Royalty 15% on Sale Price, NMET -2% on Royalty	379.70	165.09
ii.	**Socio-economic development -DMF-10% on royalty**			37.23	16.19
a.	Crop Damage Compensation				0.00
b.	Corporate Social Responsibility	Payment to SPV -10% on sale Value /DMF 10% on Royalty			0.00

c.	Income Generation Activities				0.00
d.	Community Health checkup				0.00
iii.	**Occupational Health & Safety**				0.00
a.	For routine checkup	62 persons X per annum	Budget Rs.2000/- per annum per employee	1.24	0.54
b.	Medical aid as under ESI scheme		Rs.2544/- per annum per employee	1.58	0.69
c.	Budget for training		per year	10.00	4.35
d.	Compensation for accident and injuries	Rs. 100,000 X Anticipated rate of injuries (No of workers)	Anticipated rate of Injury : 1%	0.62	0.27
iv.	**Environment Management**				0.00
a.	Maintenance of Pollution control Facilities		30 % Capital Investment	85.52	37.18
b.	Dust Suppression & Pollution Control			12.00	5.22
c.	Environmental Monitoring			15.00	6.52
d.	Environmental division			10.00	4.35
	Total Recurring Expenditure			1,226.56	533.29
				Say Rs. 533 / -	

Capital investment including Pre -emptive expences:		1842.95	Lakhs
Capital investment for Mining and Environmental Management:		1336.06	Lakhs
(Environmental controle,social development etc)			
Consideration of per tonne Working cost as on date is given below			
Recurring cost (Rs/MT)		Rs/tonne	
Expenditure on cost of Mining		292.91	
Expenditure for Socio-economic development		16.19	
Expenditure for Occupational Health and safety		5.84	
Expenditure for Environmental Management		53.27	
Expenditute on royalty ,DMF,NMET		165.09	
Total		533.29	
Value of Mineral at pit head	Rs/tonne	1079.00	
Lessee has to pay 111% on sale price as auction money	Rs/tonne	1197.69	
Summary of Viability:			
Expenditure calculated at Working cost Rs 533/- per tonne and Revenue at Rs 1079 /-per tonne,IRR found for 20 years is 20%. Hence this project is viable.			
Considerations:			
1.Sale price of Iron ore lumps & fines considered as per the IBM inputs, May '2019 data			
2. Below 55% fe lumps cost- Rs 1463/- per tonne			1463
3. 55% fe Fines cost-Rs 1079/- per tonne			1079
4. Considered dispatch of 100% fines for our capitive plant			

S. SHIVAKUMAR
M.Sc.Geology
AGM (Exploration)

Annexure 6

THE FEASIBILITY REPORT OF MINING OPERATION AT RAMDEV IRON ORE MINE (ML NO 2563) IS FURNISHED AS UNDER

1. GENERAL MINE DESCRIPTION:

Ramdev Iron ore Mine (ML No 2563) with an area of 30.09 Ha (as per CEC survey) is falls in Survey of India toposheet No D43E8 (57 A/8). Latitude & Longitudes are in datum Indian Bangladesh & WGS 84.

Sl.No	ML corner boundary point point	Latitude	Longitude
1	LBC-01	N 15° 10'07.86447"	E 76° 25' 58.46160"
2	LBC-1A	N 15° 10'13.31131"	E 76° 25' 53.38919"
3	LBC-1B	N 15° 10'21.34239 "	E 76° 25' 45.93156"
4	LBC-02	N 15° 10' 30.90740 "	E76°25'36.84620"
5	LBC-03	N 15° 10'37.35727 "	E 76° 25'44.73267"
6	LBC-3A	N 15° 10'27.66010 "	E 76° 25'54.20360"
7	LBC-04	N 15° 10'19.82714 "	E76°26'01.85564"
8	LBC-05	N 15° 10'14.06780 "	E 76° 26'06.29030 "

Regional Geology :

The Ballari–Hospet region forms a part of the „Sandur Schist Belt". The rock formation belonging to Iron ore stage of Dharwar super group of Precambrian schistose rock. The lithological units include green stones, which are the metamorphosed basic igneous rocks occupying the valley regions, with Phyllite-quartzite"s forming the canoe-shaped amphitheater of hills, trending NNW-SSE and enclosing Sandur. The Phyllites are locally Shaly and the Quartzite"s are of the nature of Banded Hematite Jaspers, and Banded Hematite Quartzites, inter banded with each other.

The Banded Hematite Jaspers, the important source rocks for the iron ore in the area are prominent in the Northern and Western part of the ranges, whereas the associated Shales become prominent in the Southern and

Eastern parts of the area. The iron ore form a capping over the quartzites and Shales and overlie a sequence of Manganiferous Phyllitic rocks. Lateritisation is widespread in most of the flat topped ridges.

Structurally, the Sandur hills form a tightly folded synclinorium, plunging gently to NNW and the hill ranges broadly delineate the folded limbs of synclines, with close repetition of strata due to minor folds. The strike of the ore bodies is generally parallel to the trend of the hill ranges and dips are often steep, being vertical at number of places. Opposing dips towards NE and SW are found in the Ramandurg and NEB ranges. The iron ore deposits of NEB range forms a part of the Bellary-Hospet group of iron ore deposits and occupy the Northern tip of Sandur Synclonorium. These deposits lie on the Northern flanks of Sandur basin.

Geology of the Mine:

Geologically the iron ore deposit at Ramdev Iron Ore Mine belongs to Donimalai formation. General strike of the formation is N35ºW-S35ºE and dipping at 60º to 70º easterly. The total strike length of the ore deposit is around 773m with an average width of about 120m. The iron ore formation found here is a part of Ramandurg Range of this sector (*i.e.* Hospet-Bellary- Sandur). The iron ore deposit pinches towards north-west side near section C-C". The rock formations in the mine lease area are as follows:

i) Soil
ii) BHQ
iii) BIF (Banded Iron Formations)
iv) Shale

The deposit occurs as a reef (at 45% Fe cut-off). Although there are no structural disturbances observed in the lease area, the recovery of iron ore is 90%. Balance 10% constitutes intercalated waste such as shales/phyllite, BHQ etc.

2. EXPLORATION:

Exploration carried out by MECL:

The drilling was taken up to estimate the iron ore reserves, MECL conducted Diamond Core drilling and RC drilling involving 233.30 m (4 Bhs core) and 1045.00 (15 Bhs RC). Total 1278.3m (19 Bhs), 1191 Nos samples were analysed.

The summary of diamond Core drilling boreholes and RC drilling boreholes that have been drilled in grid pattern 100 m X 100 m MECL so far is tabulated below.

Year	No of Boreholes		Meterage drilled		Total	
	Core drilling	RC drilling	Core drilling	RC drilling	No of holes	Meterage
2015-16 (February to March)	04	15	233.30	1045.00	19	1278.3

Source: MECL exploration data as provided along with the tender document during e-auction process.

3. RESERVE ASSESSMENT:

1) Geological & Net Geological Reserve have been estimated by MECL, bulk density of 3.5 t / Cu.m considered for calculation purpose. Mineable reserves have not been estimated.

2) As bulk density assumed in the estimation of reserves is high, considering the nature of the ore characteristics the bulk density considered as 3.5 t/ cu.m and 95% recovery of the net geological reserves as mineable by ICFRE, the details of reserves is as tabulated below.

(Quantity in Million Tones)

Category	UNFC Code	Geological Reserves (MECL)	Net Geological Reserves (90% Geological Reserves by MECL)	Mineable reserves at 95% recovery
Proved	111	8.11	7.30	6.34
Probable	122	1.89	1.70	1.48
Possible	333	0.29	0.26	0.23
	Total	10.29	9.26	8.05
	Grade		Wt. Avg. 50.89%	

3) Based on the MECL data MSPL Limited has been reclassified the estimated of reserves by considering the MECL sections the area where the bore holes are drilled at 100 m interval, the reserves are categorized as proved reserves (111) to the lowest depth, beyond that lowest depth the reserves are categorized as probable reserves (121 & 122). Some reserves are beyond ultimate pit limit and are categorized as measured mineral resources (211). Some of the reserves beyond the ultimate pit limit and beyond the proved depth area categorized as Inferred Mineral reserves (333) .The reserves / resources calculation by cross section method, category wise are reclassified as on 01-06-2019 (under UNFC Category).

	UNFC Code	Quantity in million tons	Grade %Fe
A. Total Mineral Reserve			At 45% Fe Cut-off
Proved Mineral Reserve	111	4.17	
Probable Mineral Reserve	121 and 122	2.83	
	Sub Total	**7.00**	
B. Total Remaining Resources			
Feasibility Mineral Resource	211	1.18	
Prefeasibility Mineral Resource	221 and 222	-	
Measured Mineral Resource	331	-	
Indicated Mineral Resource	332	-	
Inferred Mineral Resource	333	1.08	
Reconnaissance Mineral Resource	334	-	
	Sub Total	**2.26**	
Total Reserve (111) + Resources(211+333)		7.00+2.26**= 9.26**	

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.

Hematitic Siliceous Ore are characterising by alternate bands of hematite and siliceous material, BHQ are originated in mid-oceanic condition/transition zones, by volcanic eruption process, it indicates it is a hard rock/BHQ.

As per the prepared borehole data, longitudinal & vertical sections and analysis report the depth persistent of lithologies are varies. The deeper boreholes cross sections analysis indicates the percentage of silica content

is increasing and hardness of BHQ rock is also increased.

After plotting the ore body in LV section, it indicates depth persistent of litho-logs varies, due to considering these geological, lithological & analytical results. Based on the geological setup of ore body the Iron Ore analysis +35%Fe to 45%Fe is meagerly and not consistent so that we have not assessed / calculated Heamatatic Siliceous Ore. If at all while mining producing of +35%Fe to 45%Fe will be stock in separately.

Entire lease area has been explored fully. All the samples were analyzed Wt.Avg. 50.89 % Fe. There is no sub grade mineral.

4. PRODUCTION SCHEDULE:

The updated category wise reserves is 7.00 MMT. However at the present rate of production capacity 0.23 MTPA, the life of the mine will be 31 years. Whereas LOI issued has been for period of 50 years.

5. MINING METHOD:

The existing geometry of the benches are irregular, it is proposed to work fully mechanized and maintain the height of the bench is 10 m and width of bench will be more than 10 m except S11 to S14. In S11 to S14 it is proposed the bench width will be 8 m to exhaust the iron ore. The road gradient maintained at 1:16. Pit slope angle will be at 36° to 45° and bench slope angle will be 70°- 80°. It will be maintained as per statutory requirement, the benches are being providing with connecting ramps which is having the gradient 1:16 with hair pin curves and in cases where the bench to bench connection at the bottom/face, the gradient is 1:10 will be mentioned for a distance of not exceeding 100 m as per the statutory requirements.
The present RL minimum m RL is 820 and maximum m RL is 920, The advance of benches will be extended towards north west to south east making pits during the first five year period.

It is proposed to work between coordinates E 653300 to 654100 N 1677700 to 1678400 for five year plan period.

Ramdev Iron Ore Mine is being operated by open cast mining method with high mechanization comprising of hydraulic excavators and dumpers combinations. There is no change in proposal method of excavation.

For the conceptual period it is proposed the height and width of the benches are about 8-9 m, with haul road width more than 10 m with

gradient maintained at 1:16. Pit slope angle is maintained at 36° to 55° and bench slopes are 70° 80°.To win the blocked ore 1.18 MMT under 211 category additional area is required, accordingly we are requesting the state government in future.

Estimation of ore and waste is calculated up to the life of the mine. The ore to overburden volumetric ratio is 1:1.03. Processed ore will be dispatched to MSPL Pellet Plant for its captive use.

6. BENEFICIATION:

Processing of ROM: Mobile crushing and screening plant (150 TPH)

ROM comes to the crushing & screening plant through the trucks and gets delivered to grizzly. Oversize of grizzly flows directly to one number jaw crusher. Jaw crusher product passes through one triple deck screen (40, 20, 10 mm opening), with the lowest deck as 10 mm. -10 mm material from this screen is diverted to product stockpile, whereas the -20+10mm goes to one number tertiary crusher. +20 mm material goes to one number secondary crusher. The product of secondary crusher goes to same triple deck screen and follows path as described above.

Product of tertiary crusher goes to one vibrating screening of 10 mm. -10 mm material reports to the product stockpile, whereas +10mm material goes back to tertiary crusher. Thus product of 100% -10mm is produced out of the crushing and screening plant. The product which is coming out from crushers will be loaded to the Tippers / Dumpers and it will be transported and unloaded in to the designated stock piles. The external tippers will utilised for the dispatch of products from stock piles/Crushers.

There is no beatification process at mine site.

7. MARKETING:

The total ROM ore produced from this mine will be crushed and screened the ore will be dispatched to MSPL Pellet Plant for its captive use. Physical specification of ore is 100% -10 mm, the chemical composition of processed ore at 45% Fe cut-off grade with Wt. Avg. 51.68% Fe for the five plan period.

The present sale prize for calibrated ore below 55% Fe is Rs 1463/- per ton and fines Rs. 1079/- per ton on the basis of information of IBM for the month of May 2019.

8. INFRASTRUCTURE:

The mining lease is located in Ramgad Reserve forest, Sandur taluk, Ballari district, Karnataka state.

Major site services are proposed at the mine for workshop, store, electric sub station, first aid room, water quality, canteen, mine office, HSD layout, computer section. The manpower employed at Ramdev Iron ore Mine for mining and related operations is 65 (Highly Skilled - 15, Skilled-20, Semi-Skilled -20, Un-Skilled- 10) and 19 statutory requirement.

9. ENVIRONMENTAL REQUIREMENTS:

The Mine has environmental clearance. The Mining Plan (including Progressive mine closure plan) to be obtained from Indian Bureau of Mines, Bengaluru, and consent for operation from SPCB. The final mine closure plan will be submitted at the time of final closure. The reclamation and rehabilitation plans were prepared by ICFRE and approved by CEC. The annual capacity of the production is 0.23 MTPA fixed by CEC.

10. OTHERS LIKE LEGAL FACTORS LIKE TRIBAL ISSUES, NATIONAL PARKS ETC.,:

Nil.

11. ECONOMIC EVALUATION:

Budget for Proposed Mining				
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)
Capital Investment				1842.95
I	**Land**			506.89
a	Land cost expenditure	Rs 15.60 Lakh / Ha. For forest land	Area: 32.49 Ha. Forest land (ML area & road)	506.89
b	Cost on relief and rehabilitation action plan		Rehabilitation not required	0.00
c.	compensation to the land outstees		No land outstees	0.00

d.	Cost of acquiring surface Rights		Not required as it is Forest land	0.00
II.	**Mining**			996.00
a.	Cost of Infrastructure & equipments		Mechanized mining	996.00
III.	**Environmental protection**			285.06
a.	Pollution Control (check dam, gully plug, settling tanks, water tanker, etc.)			
	Garland Drain			285.06
	Retaining Walls			
	Settling ponds			
	Plantation, Terrecing			
	Water Tanker			
	Bund with stone boulders			
	Masonary check dam			
	Gully plugs			
	Reclaming area under encroachment			
IV.	**Socio-economic development**			50
a.	Infrastructure development (Edu, Medical, etc)			
i.	Educational facilities	Free Scholarship for higher education in the buffer zone		15
ii.	Medical facilities	Health check up of villagers villages in buffer zone & workers		10
iii.	Others			5
b.	Income Generation Activities	Financial support for interest free loans	Financial Support to SHG	20

V.	**Occupational Health & Safety**			5
a.	Infrastructure & PPEs			5
VI	**Payment to Govenment-Auction Charges**			1533.90
a	Stamp duty for Registrtion of MDPA			709.43
b	Payments regarding Exploration,DGPS survey & RR preparation,etc			372.74
c	Upfront Paymnet including all installments			451.73
	Total Capital Investment			3376.85
			Say Rs. 3377 lakhs	

Budget for Proposed Mining					
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)	Cost per tonne in Rs.
Recurring Expenditure				1,226.56	533.29
i	**Mining**				
a.	Expenditure for infrastructure and equipment maintenance		15 % of direct investment for infrastructure & maintenance	149.40	64.96
b.	Mining of ore and waste	Rs. Per ton	Rs. 190 / ton	437.00	190.00
c.	Salaries & Wages of 62 staffs	No of workers X Wages	Rs. 1,40,777/- per Annum	87.28	37.95
d.	Royalty on mineral & miscellaneous	Rs. Per ton	Royalty 15% on Sale Price, NMET -2% on Royalty	379.70	165.09
ii.	**Socio-economic development -DMF-10% on royalty**			37.23	16.19
a.	Crop Damage Compensation				0.00
b.	Corporate Social Responsibility	Payment to SPV -10% on sale Value /DMF 10% on Royalty			0.00

c.	Income Generation Activities				0.00
d.	Community Health checkup				0.00
iii.	**Occupational Health & Safety**				0.00
a.	For routine checkup	62 persons X per annum	Budget Rs.2000/- per annum per employee	1.24	0.54
b.	Medical aid as under ESI scheme		Rs.2544/- per annum per employee	1.58	0.69
c.	Budget for training		per year	10.00	4.35
d.	Compensation for accident and injuries	Rs. 100,000 X Anticipated rate of injuries (No of workers)	Anticipated rate of Injury : 1%	0.62	0.27
iv.	**Environment Management**				0.00
a.	Maintenance of Pollution control Facilities		30 % Capital Investment	85.52	37.18
b.	Dust Suppression & Pollution Control			12.00	5.22
c.	Environmental Monitoring			15.00	6.52
d.	Environmental division			10.00	4.35
	Total Recurring Expenditure			1,226.56	533.29
				Say Rs. 533 / -	

Capital investment including Pre -emptive expences:		1842.95	Lakhs
Capital investment for Mining and Environmental Management:		1336.06	Lakhs
(Environmental controle,social development etc)			
Consideration of per tonne Working cost as on date is given below			
Recurring cost (Rs/MT)		Rs/tonne	
Expenditure on cost of Mining		292.91	
Expenditure for Socio-economic development		16.19	
Expenditure for Occupational Health and safety		5.84	
Expenditure for Environmental Management		53.27	
Expenditute on royalty ,DMF,NMET		165.09	
Total		533.29	
Value of Mineral at pit head	Rs/tonne	1079.00	
Lessee has to pay 111% on sale price as auction money	Rs/tonne	1197.69	
Summary of Viability:			
Expenditure calculated at Working cost Rs 533/- per tonne and Revenue at Rs 1079 /-per tonne,IRR found for 20 years is 20%. Hence this project is viable.			
Considerations:			
1.Sale price of Iron ore lumps & fines considered as per the IBM inputs, May '2019 data			
2. Below 55% fe lumps cost- Rs 1463/- per tonne			1463
3. 55% fe Fines cost-Rs 1079/- per tonne			1079
4. Considered dispatch of 100% fines for our capitive plant			

S. SHIVAKUMAR
M.Sc.Geology
AGM (Exploration)

Annexure 6

THE FEASIBILITY REPORT OF MINING OPERATION AT RAMDEV IRON ORE MINE (ML NO 2563) IS FURNISHED AS UNDER

1. GENERAL MINE DESCRIPTION:

Ramdev Iron ore Mine (ML No 2563) with an area of 30.09 Ha (as per CEC survey) is falls in Survey of India toposheet No D43E8 (57 A/8). Latitude & Longitudes are in datum Indian Bangladesh & WGS 84.

Sl.No	ML corner boundary point point	Latitude	Longitude
1	LBC-01	N 15° 10'07.86447"	E 76° 25' 58.46160"
2	LBC-1A	N 15° 10'13.31131"	E 76° 25' 53.38919"
3	LBC-1B	N 15° 10'21.34239 "	E 76° 25' 45.93156"
4	LBC-02	N 15° 10' 30.90740 "	E76°25'36.84620"
5	LBC-03	N 15° 10'37.35727 "	E 76° 25'44.73267"
6	LBC-3A	N 15° 10'27.66010 "	E 76° 25'54.20360"
7	LBC-04	N 15° 10'19.82714 "	E76°26'01.85564"
8	LBC-05	N 15° 10'14.06780 "	E 76° 26'06.29030 "

Regional Geology :

The Ballari–Hospet region forms a part of the „Sandur Schist Belt". The rock formation belonging to Iron ore stage of Dharwar super group of Precambrian schistose rock. The lithological units include green stones, which are the metamorphosed basic igneous rocks occupying the valley regions, with Phyllite-quartzite"s forming the canoe-shaped amphitheater of hills, trending NNW-SSE and enclosing Sandur. The Phyllites are locally Shaly and the Quartzite"s are of the nature of Banded Hematite Jaspers, and Banded Hematite Quartzites, inter banded with each other.

The Banded Hematite Jaspers, the important source rocks for the iron ore in the area are prominent in the Northern and Western part of the ranges, whereas the associated Shales become prominent in the Southern and

Eastern parts of the area. The iron ore form a capping over the quartzites and Shales and overlie a sequence of Manganiferous Phyllitic rocks. Lateritisation is widespread in most of the flat topped ridges.

Structurally, the Sandur hills form a tightly folded synclinorium, plunging gently to NNW and the hill ranges broadly delineate the folded limbs of synclines, with close repetition of strata due to minor folds. The strike of the ore bodies is generally parallel to the trend of the hill ranges and dips are often steep, being vertical at number of places. Opposing dips towards NE and SW are found in the Ramandurg and NEB ranges. The iron ore deposits of NEB range forms a part of the Bellary-Hospet group of iron ore deposits and occupy the Northern tip of Sandur Synclonorium. These deposits lie on the Northern flanks of Sandur basin.

Geology of the Mine:

Geologically the iron ore deposit at Ramdev Iron Ore Mine belongs to Donimalai formation. General strike of the formation is N35ºW-S35ºE and dipping at 60º to 70º easterly. The total strike length of the ore deposit is around 773m with an average width of about 120m. The iron ore formation found here is a part of Ramandurg Range of this sector (*i.e.* Hospet-Bellary- Sandur). The iron ore deposit pinches towards north-west side near section C-C". The rock formations in the mine lease area are as follows:

i) Soil
ii) BHQ
iii) BIF (Banded Iron Formations)
iv) Shale

The deposit occurs as a reef (at 45% Fe cut-off). Although there are no structural disturbances observed in the lease area, the recovery of iron ore is 90%. Balance 10% constitutes intercalated waste such as shales/phyllite, BHQ etc.

2. EXPLORATION:

Exploration carried out by MECL:

The drilling was taken up to estimate the iron ore reserves, MECL conducted Diamond Core drilling and RC drilling involving 233.30 m (4 Bhs core) and 1045.00 (15 Bhs RC). Total 1278.3m (19 Bhs), 1191 Nos samples were analysed.

The summary of diamond Core drilling boreholes and RC drilling boreholes that have been drilled in grid pattern 100 m X 100 m MECL so far is tabulated below.

Year	No of Boreholes		Meterage drilled		Total	
	Core drilling	RC drilling	Core drilling	RC drilling	No of holes	Meterage
2015-16 (February to March)	04	15	233.30	1045.00	19	1278.3

Source: MECL exploration data as provided along with the tender document during e-auction process.

3. RESERVE ASSESSMENT:

1) Geological & Net Geological Reserve have been estimated by MECL, bulk density of 3.5 t / Cu.m considered for calculation purpose. Mineable reserves have not been estimated.

2) As bulk density assumed in the estimation of reserves is high, considering the nature of the ore characteristics the bulk density considered as 3.5 t/ cu.m and 95% recovery of the net geological reserves as mineable by ICFRE, the details of reserves is as tabulated below.

(Quantity in Million Tones)

Category	UNFC Code	Geological Reserves (MECL)	Net Geological Reserves (90% Geological Reserves by MECL)	Mineable reserves at 95% recovery
Proved	111	8.11	7.30	6.34
Probable	122	1.89	1.70	1.48
Possible	333	0.29	0.26	0.23
	Total	10.29	9.26	8.05
	Grade		Wt. Avg. 50.89%	

3) Based on the MECL data MSPL Limited has been reclassified the estimated of reserves by considering the MECL sections the area where the bore holes are drilled at 100 m interval, the reserves are categorized as proved reserves (111) to the lowest depth, beyond that lowest depth the reserves are categorized as probable reserves (121 & 122). Some reserves are beyond ultimate pit limit and are categorized as measured mineral resources (211). Some of the reserves beyond the ultimate pit limit and beyond the proved depth area categorized as Inferred Mineral reserves (333) .The reserves / resources calculation by cross section method, category wise are reclassified as on 01-06-2019 (under UNFC Category).

	UNFC Code	Quantity in million tons	Grade %Fe
A. Total Mineral Reserve			At 45% Fe Cut-off
Proved Mineral Reserve	111	4.17	
Probable Mineral Reserve	121 and 122	2.83	
	Sub Total	**7.00**	
B. Total Remaining Resources			
Feasibility Mineral Resource	211	1.18	
Prefeasibility Mineral Resource	221 and 222	-	
Measured Mineral Resource	331	-	
Indicated Mineral Resource	332	-	
Inferred Mineral Resource	333	1.08	
Reconnaissance Mineral Resource	334	-	
	Sub Total	**2.26**	
Total Reserve (111) + Resources(211+333)		7.00+2.26**= 9.26**	

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.

Hematitic Siliceous Ore are characterising by alternate bands of hematite and siliceous material, BHQ are originated in mid-oceanic condition/transition zones, by volcanic eruption process, it indicates it is a hard rock/BHQ.

As per the prepared borehole data, longitudinal & vertical sections and analysis report the depth persistent of lithologies are varies. The deeper boreholes cross sections analysis indicates the percentage of silica content

is increasing and hardness of BHQ rock is also increased.

After plotting the ore body in LV section, it indicates depth persistent of litho-logs varies, due to considering these geological, lithological & analytical results. Based on the geological setup of ore body the Iron Ore analysis +35%Fe to 45%Fe is meagerly and not consistent so that we have not assessed / calculated Heamatatic Siliceous Ore. If at all while mining producing of +35%Fe to 45%Fe will be stock in separately.

Entire lease area has been explored fully. All the samples were analyzed Wt.Avg. 50.89 % Fe. There is no sub grade mineral.

4. PRODUCTION SCHEDULE:

The updated category wise reserves is 7.00 MMT. However at the present rate of production capacity 0.23 MTPA, the life of the mine will be 31 years. Whereas LOI issued has been for period of 50 years.

5. MINING METHOD:

The existing geometry of the benches are irregular, it is proposed to work fully mechanized and maintain the height of the bench is 10 m and width of bench will be more than 10 m except S11 to S14. In S11 to S14 it is proposed the bench width will be 8 m to exhaust the iron ore. The road gradient maintained at 1:16. Pit slope angle will be at 36° to 45° and bench slope angle will be 70°- 80°. It will be maintained as per statutory requirement, the benches are being providing with connecting ramps which is having the gradient 1:16 with hair pin curves and in cases where the bench to bench connection at the bottom/face, the gradient is 1:10 will be mentioned for a distance of not exceeding 100 m as per the statutory requirements.
The present RL minimum m RL is 820 and maximum m RL is 920, The advance of benches will be extended towards north west to south east making pits during the first five year period.

It is proposed to work between coordinates E 653300 to 654100 N 1677700 to 1678400 for five year plan period.

Ramdev Iron Ore Mine is being operated by open cast mining method with high mechanization comprising of hydraulic excavators and dumpers combinations. There is no change in proposal method of excavation.

For the conceptual period it is proposed the height and width of the benches are about 8-9 m, with haul road width more than 10 m with

gradient maintained at 1:16. Pit slope angle is maintained at 36° to 55° and bench slopes are 70° 80°.To win the blocked ore 1.18 MMT under 211 category additional area is required, accordingly we are requesting the state government in future.

Estimation of ore and waste is calculated up to the life of the mine. The ore to overburden volumetric ratio is 1:1.03. Processed ore will be dispatched to MSPL Pellet Plant for its captive use.

6. BENEFICIATION:

Processing of ROM: Mobile crushing and screening plant (150 TPH)

ROM comes to the crushing & screening plant through the trucks and gets delivered to grizzly. Oversize of grizzly flows directly to one number jaw crusher. Jaw crusher product passes through one triple deck screen (40, 20, 10 mm opening), with the lowest deck as 10 mm. -10 mm material from this screen is diverted to product stockpile, whereas the -20+10mm goes to one number tertiary crusher. +20 mm material goes to one number secondary crusher. The product of secondary crusher goes to same triple deck screen and follows path as described above.

Product of tertiary crusher goes to one vibrating screening of 10 mm. -10 mm material reports to the product stockpile, whereas +10mm material goes back to tertiary crusher. Thus product of 100% -10mm is produced out of the crushing and screening plant. The product which is coming out from crushers will be loaded to the Tippers / Dumpers and it will be transported and unloaded in to the designated stock piles. The external tippers will utilised for the dispatch of products from stock piles/Crushers.

There is no beatification process at mine site.

7. MARKETING:

The total ROM ore produced from this mine will be crushed and screened the ore will be dispatched to MSPL Pellet Plant for its captive use. Physical specification of ore is 100% -10 mm, the chemical composition of processed ore at 45% Fe cut-off grade with Wt. Avg. 51.68% Fe for the five plan period.

The present sale prize for calibrated ore below 55% Fe is Rs 1463/- per ton and fines Rs. 1079/- per ton on the basis of information of IBM for the month of May 2019.

8. INFRASTRUCTURE:

The mining lease is located in Ramgad Reserve forest, Sandur taluk, Ballari district, Karnataka state.

Major site services are proposed at the mine for workshop, store, electric sub station, first aid room, water quality, canteen, mine office, HSD layout, computer section. The manpower employed at Ramdev Iron ore Mine for mining and related operations is 65 (Highly Skilled - 15, Skilled-20, Semi-Skilled -20, Un-Skilled- 10) and 19 statutory requirement.

9. ENVIRONMENTAL REQUIREMENTS:

The Mine has environmental clearance. The Mining Plan (including Progressive mine closure plan) to be obtained from Indian Bureau of Mines, Bengaluru, and consent for operation from SPCB. The final mine closure plan will be submitted at the time of final closure. The reclamation and rehabilitation plans were prepared by ICFRE and approved by CEC. The annual capacity of the production is 0.23 MTPA fixed by CEC.

10. OTHERS LIKE LEGAL FACTORS LIKE TRIBAL ISSUES, NATIONAL PARKS ETC.,:

Nil.

11. ECONOMIC EVALUATION:

Budget for Proposed Mining				
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)
Capital Investment				1842.95
I	**Land**			506.89
a	Land cost expenditure	Rs 15.60 Lakh / Ha. For forest land	Area: 32.49 Ha. Forest land (ML area & road)	506.89
b	Cost on relief and rehabilitation action plan		Rehabilitation not required	0.00
c.	compensation to the land outstees		No land outstees	0.00

d.	Cost of acquiring surface Rights		Not required as it is Forest land	0.00
II.	**Mining**			996.00
a.	Cost of Infrastructure & equipments		Mechanized mining	996.00
III.	**Environmental protection**			285.06
a.	Pollution Control (check dam, gully plug, settling tanks, water tanker, etc.)			
	Garland Drain			285.06
	Retaining Walls			
	Settling ponds			
	Plantation, Terrecing			
	Water Tanker			
	Bund with stone boulders			
	Masonary check dam			
	Gully plugs			
	Reclaming area under encroachment			
IV.	**Socio-economic development**			50
a.	Infrastructure development (Edu, Medical, etc)			
i.	Educational facilities	Free Scholarship for higher education in the buffer zone		15
ii.	Medical facilities	Health check up of villagers villages in buffer zone & workers		10
iii.	Others			5
b.	Income Generation Activities	Financial support for interest free loans	Financial Support to SHG	20

V.	**Occupational Health & Safety**			5
a.	Infrastructure & PPEs			5
VI	**Payment to Govenment-Auction Charges**			1533.90
a	Stamp duty for Registrtion of MDPA			709.43
b	Payments regarding Exploration,DGPS survey & RR preparation,etc			372.74
c	Upfront Paymnet including all installments			451.73
	Total Capital Investment			3376.85
			Say Rs. 3377 lakhs	

Budget for Proposed Mining					
Activities	Areas of investment	Method of Calclation	Basics	Expenses (In Lakh Rs.)	Cost per tonne in Rs.
Recurring Expenditure				1,226.56	533.29
i	**Mining**				
a.	Expenditure for infrastructure and equipment maintenance		15 % of direct investment for infrastructure & maintenance	149.40	64.96
b.	Mining of ore and waste	Rs. Per ton	Rs. 190 / ton	437.00	190.00
c.	Salaries & Wages of 62 staffs	No of workers X Wages	Rs. 1,40,777/- per Annum	87.28	37.95
d.	Royalty on mineral & miscellaneous	Rs. Per ton	Royalty 15% on Sale Price, NMET -2% on Royalty	379.70	165.09
ii.	**Socio-economic development -DMF-10% on royalty**			37.23	16.19
a.	Crop Damage Compensation				0.00
b.	Corporate Social Responsibility	Payment to SPV -10% on sale Value /DMF 10% on Royalty			0.00

c.	Income Generation Activities				0.00
d.	Community Health checkup				0.00
iii.	**Occupational Health & Safety**				0.00
a.	For routine checkup	62 persons X per annum	Budget Rs.2000/- per annum per employee	1.24	0.54
b.	Medical aid as under ESI scheme		Rs.2544/- per annum per employee	1.58	0.69
c.	Budget for training		per year	10.00	4.35
d.	Compensation for accident and injuries	Rs. 100,000 X Anticipated rate of injuries (No of workers)	Anticipated rate of Injury : 1%	0.62	0.27
iv.	**Environment Management**				0.00
a.	Maintenance of Pollution control Facilities		30 % Capital Investment	85.52	37.18
b.	Dust Suppression & Pollution Control			12.00	5.22
c.	Environmental Monitoring			15.00	6.52
d.	Environmental division			10.00	4.35
	Total Recurring Expenditure			1,226.56	533.29
				Say Rs. 533 / -	

Capital investment including Pre -emptive expences:		1842.95	Lakhs
Capital investment for Mining and Environmental Management:		1336.06	Lakhs
(Environmental controle,social development etc)			
Consideration of per tonne Working cost as on date is given below			
Recurring cost (Rs/MT)		Rs/tonne	
Expenditure on cost of Mining		292.91	
Expenditure for Socio-economic development		16.19	
Expenditure for Occupational Health and safety		5.84	
Expenditure for Environmental Management		53.27	
Expenditute on royalty ,DMF,NMET		165.09	
Total		533.29	
Value of Mineral at pit head	Rs/tonne	1079.00	
Lessee has to pay 111% on sale price as auction money	Rs/tonne	1197.69	
Summary of Viability:			
Expenditure calculated at Working cost Rs 533/- per tonne and Revenue at Rs 1079 /-per tonne,IRR found for 20 years is 20%. Hence this project is viable.			
Considerations:			
1.Sale price of Iron ore lumps & fines considered as per the IBM inputs, May '2019 data			
2. Below 55% fe lumps cost- Rs 1463/- per tonne			1463
3. 55% fe Fines cost-Rs 1079/- per tonne			1079
4. Considered dispatch of 100% fines for our capitive plant			

S. SHIVAKUMAR
M.Sc.Geology
AGM (Exploration)

ANNEXURE - 7

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED

ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA (ML.No.2563)

ESTIMATION OF RESERVES / RESOURCES at 45% Fe cut off AS ON 01-06-2019 (AS PER MECL BULK DENSITY 3.50 T/M3 AND 90% OF GEOLOGICAL RESERVES)

SECTION	AREA (Sq.m)					SECTIONAL INFLU	VOLUME (Cu.m)					TONNAGE (Bulk Density-3.50 t/Cu.m)					
	111	121 / 122	211	333	TOTAL		111	121 / 122	211	333	TOTAL	111	121 / 122	211	333	TOTAL	90 % Recovery
S-1	321	0	2434	3095	**5850**	32.97	10583	0	80249	102042	**192875**	37042	0	280871	357148	**675061**	**607555**
S-2	1117	0	800	1460	**3377**	28.41	31734	0	22728	41479	**95941**	111069	0	79548	145175	**335792**	**302213**
S-3	1560	709	0	2076	**4345**	30.05	46878	21305	0	62384	**130567**	164073	74569	0	218343	**456985**	**411287**
S-4	1526	1403	0	1051	**3980**	66.05	100792	92668	0	69386	**262846**	352773	324339	0	242849	**919961**	**827965**
S-5	0	0	0	0	**0**	103.71	0	0	0	0	**0**	0	0	0	0	**0**	**0**
S-6	768	968	0	0	**1736**	95.36	73236	92308	0	0	**165545**	256328	323080	0	0	**579407**	**521467**
S-7	3907	702	0	0	**4609**	98.86	386246	69400	0	0	**455646**	1351861	242899	0	0	**1594760**	**1435284**
S-8	3401	2078	3153	666	**9298**	79.00	268679	164162	249087	52614	**734542**	940377	574567	871805	184149	**2570897**	**2313807**
S-9	0	0	0	0	**0**	51.26	0	0	0	0	**0**	0	0	0	0	**0**	**0**
S-10	906	1847	230	0	**2983**	69.46	62931	128293	15976	0	**207199**	220258	449024	55915	0	**725197**	**652677**
S-11	587	1192	0	0	**1779**	87.31	51251	104074	0	0	**155324**	179378	364257	0	0	**543636**	**489272**
S-12	283	564	127	266	**1240**	51.73	14640	29176	6570	13760	**64145**	51239	102115	22994	48161	**224508**	**202057**
S-13	2596	2409	0	0	**5005**	64.58	167650	155573	0	0	**323223**	586774	544506	0	0	**1131280**	**1018152**
S-14	1203	477	0	0	**1680**	90.26	108583	43040	0	0	**151623**	380040	150642	0	0	**530681**	**477613**
TOTAL	**18175**	**12349**	**6744**	**8614**	**45881**	**949.01**	**1323203**	**899999**	**374609**	**341664**	**2939476**	**4631210**	**3149998**	**1311133**	**1195825**	**10288166**	**9259349**
											90 % Recovery	**4168089**	**2834998**	**1180020**	**1076242**	**9259349**	

SECTION	IN MILLION TONS							Weighted Average Grade %		
	RESERVES (90 % Recoveray)			RESOURCES (90 % Recoveray)			GRAND TOTAL	Fe	SiO2	Al2O3
	111	121 / 122	TOTAL	211	333	TOTAL				
S-1	0.03	0.00	**0.03**	0.25	0.32	**0.57**	**0.61**	50.79	15.38	8.45
S-2	0.10	0.00	**0.10**	0.07	0.13	**0.20**	**0.30**	50.79	15.38	8.45
S-3	0.15	0.07	**0.21**	0.00	0.20	**0.20**	**0.41**	48.44	22.19	5.90
S-4	0.32	0.29	**0.61**	0.00	0.22	**0.22**	**0.83**	48.44	22.19	5.90
S-5	0.00	0.00	**0.00**	0.00	0.00	**0.00**	**0.00**	0.00	0.00	0.00
S-6	0.23	0.29	**0.52**	0.00	0.00	**0.00**	**0.52**	46.21	27.76	2.84
S-7	1.22	0.22	**1.44**	0.00	0.00	**0.00**	**1.44**	57.21	12.46	4.02
S-8	0.85	0.52	**1.36**	0.78	0.17	**0.95**	**2.31**	47.63	17.76	4.85
S-9	0.00	0.00	**0.00**	0.00	0.00	**0.00**	**0.00**	0.00	0.00	0.00
S-10	0.20	0.40	**0.60**	0.05	0.00	**0.05**	**0.65**	48.38	26.68	2.17
S-11	0.16	0.33	**0.49**	0.00	0.00	**0.00**	**0.49**	51.89	23.31	1.09
S-12	0.05	0.09	**0.14**	0.02	0.04	**0.06**	**0.20**	57.27	13.16	3.79
S-13	0.53	0.49	**1.02**	0.00	0.00	**0.00**	**1.02**	53.40	18.11	4.48
S-14	0.34	0.14	**0.48**	0.00	0.00	**0.00**	**0.48**	53.62	13.99	6.27
TOTAL	**4.17**	**2.83**	**7.00**	**1.18**	**1.08**	**2.26**	**9.26**	**50.89**	**17.90**	**4.56**

RESERVES / RESOURCES		
UNFC CODE	In Tons	In Million Tons
111	4168089	4.17
121 & 122	2834998	2.83
TOTAL	**7003087**	**7.00**
211	1180020	1.18
333	1076242	1.08
TOTAL	**2256262**	**2.26**
GRAND TOTAL	**9259349**	**9.26**

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED

ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA (ML.No.2563)

ESTIMATION OF WASTE

SECTION	AREA (Sq.m)			SECTIONAL INFLU	VOLUME (Cu.m)				TONNAGE (Bulk Density-2.00 t/Cu.m)			
	Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	TOTAL		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated	TOTAL	Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated	TOTAL
S-1	0	0	**0**	32.97	0	0	1058	**1058**	0	0	2117	**2117**
S-2	0	118	**118**	28.41	0	3352	3173	**6526**	0	6705	6347	**13052**
S-3	1405	912	**2317**	30.05	42220	27406	6818	**76444**	84441	54811	13637	**152888**
S-4	686	869	**1555**	66.05	45310	57397	19346	**122054**	90621	114795	38692	**244108**
S-5	0	0	**0**	103.71	0	0	0	**0**	0	0	0	**0**
S-6	1035	3020	**4055**	95.36	98698	287987	16554	**403239**	197395	575974	33109	**806479**
S-7	361	2061	**2422**	98.86	35688	203750	45565	**285003**	71377	407501	91129	**570007**
S-8	559	1400	**1959**	104.26	58281	145964	43284	**247529**	116563	291928	86568	**495059**
S-9	0	0	**0**	51.26	0	0	0	**0**	0	0	0	**0**
S-10	137	977	**1114**	95.46	13078	93264	19122	**125465**	26156	186529	38245	**250930**
S-11	580	3376	**3956**	87.31	50640	294759	15532	**360931**	101280	589517	31065	**721862**
S-12	613	4648	**5261**	51.73	31710	240441	4382	**276533**	63421	480882	8763	**553066**
S-13	504	2178	**2682**	64.58	32548	140655	32322	**205526**	65097	281310	64645	**411052**
S-14	92	989	**1081**	90.26	8304	89267	15162	**112733**	16608	178534	30325	**225467**
TOTAL	**5972**	**20548**	**26520**		**416479**	**1584243**	**222320**	**2223042**	**832957**	**3168487**	**444640**	**4446084**

SUMMARY

PARTICULAR	ORE	DEVELOPMENT	RATIO
TONNAGE	7003087	4446084	0.63
VOLUMETRIC	2223202	2223042	1.00
TONS / CU.M	7003087	2223042	0.32

ANNEXURE - 8(A)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA
DEVELOPMENT & PRODUCTION FOR THE 1 ST YEAR

ORE

SECTION	AREA (Sq.m)	SECTIONAL INFLU	VOLUME (Cu.m) 90% Recoveary	TONNAGE (Bulk Density-3.50 t/Cu.m)	At 45% Cut- off Grade		
					Fe	SiO2	Al2O3
S-1	0	32.97	0	**0**	0.00	0.00	0.00
S-2	163	28.41	4173	**14605**	43.02	17.11	15.04
S-3	96	30.05	2596	**9087**	48.62	26.62	3.32
S-4	63	66.05	3745	**13108**	48.62	26.62	3.32
S-5	0	103.71	0	**0**	0.00	0.00	0.00
S-6	0	95.36	0	**0**	0.00	0.00	0.00
S-7	0	98.86	0	**0**	0.00	0.00	0.00
S-8	0	79.00	0	**0**	0.00	0.00	0.00
S-9	0	51.26	0	**0**	0.00	0.00	0.00
S-10	0	69.46	0	**0**	0.00	0.00	0.00
S-11	79	87.31	6208	**21727**	54.03	18.56	1.59
S-12	200	51.73	9311	**32590**	64.75	4.55	2.56
S-13	160	64.58	9300	**32548**	55.53	15.44	4.77
S-14	374	90.26	30382	**106335**	47.41	18.94	8.58
TOTAL	**1135**		**65714**	**230000**	**51.48**	**16.99**	**6.43**

DEVELOPMENT

SECTION	AREA (Sq.m)		SECTIONAL INFLU	VOLUME (Cu.m)			TOTAL	TONNAGE (Bulk Density-2.00 t/Cu.m)			TOTAL
	Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated	
S-1	0	0	32.97	0	0	0	**0**	0	0	0	**0**
S-2	0	0	28.41	0	0	464	**464**	0	0	927	**927**
S-3	0	151	30.05	0	4538	288	**4826**	0	9075	577	**9652**
S-4	5	196	66.05	330	12946	416	**13692**	661	25892	832	**27384**
S-5	0	0	103.71	0	0	0	**0**	0	0	0	**0**
S-6	0	0	95.36	0	0	0	**0**	0	0	0	**0**
S-7	0	0	98.86	0	0	0	**0**	0	0	0	**0**
S-8	0	0	79.00	0	0	0	**0**	0	0	0	**0**
S-9	0	0	51.26	0	0	0	**0**	0	0	0	**0**
S-10	0	0	69.46	0	0	0	**0**	0	0	0	**0**
S-11	0	33	87.31	0	2881	690	**3571**	0	5762	1379	**7142**
S-12	88	20	51.73	4552	1035	1035	**6621**	9104	2069	2069	**13243**
S-13	21	77	64.58	1356	4973	1033	**7362**	2712	9945	2067	**14724**
S-14	24	130	90.26	2166	11734	3376	**17276**	4332	23468	6751	**34552**
TOTAL	**138**	**607**		**8405**	**38106**	**7302**	**53812**	**16810**	**76211**	**14603**	**107624**

SUMMARY			ORE TO OB RATIO
PARTICULAR	ORE	DEVELOPMENT	
TONNAGE	230000	107624	**0.47**
VOLUMETRIC	65714	53812	**0.82**
TONS / CU.M	230000	53812	**0.23**

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA
DEVELOPMENT & PRODUCTION FOR THE 2 ND YEAR

ORE

SECTION	AREA (Sq.m)	SECTIONAL INFLU	VOLUME (Cu.m) 90% Recoveary	TONNAGE (Bulk Density-3.50 t/Cu.m)	At 45% Cut- off Grade		
					Fe	SiO2	Al2O3
S-1	0	32.97	0	**0**	0.00	0.00	0.00
S-2	76	28.41	1943	**6801**	43.02	17.11	15.04
S-3	124	30.05	3346	**11710**	48.62	26.62	3.32
S-4	156	66.05	9273	**32457**	48.62	26.62	3.32
S-5	0	103.71	0	**0**	0.00	0.00	0.00
S-6	0	95.36	0	**0**	0.00	0.00	0.00
S-7	0	98.86	0	**0**	0.00	0.00	0.00
S-8	0	79.00	0	**0**	0.00	0.00	0.00
S-9	0	51.26	0	**0**	0.00	0.00	0.00
S-10	0	69.46	0	**0**	0.00	0.00	0.00
S-11	114	87.31	8958	**31353**	49.54	24.39	0.88
S-12	30	51.73	1397	**4888**	64.08	5.46	2.51
S-13	182	64.58	10578	**37024**	55.53	15.44	4.77
S-14	372	90.26	30219	**105767**	50.13	15.73	8.16
TOTAL	**1054**		**65714**	**230000**	**50.72**	**18.78**	**5.78**

DEVELOPMENT

SECTION	AREA (Sq.m)		SECTIONAL INFLU	VOLUME (Cu.m)			TOTAL	TONNAGE (Bulk Density-2.00 t/Cu.m)			TOTAL
	Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated	
S-1	0	0	32.97	0	0	0	**0**	0	0	0	**0**
S-2	0	0	28.41	0	0	216	**216**	0	0	432	**432**
S-3	0	23	30.05	0	691	372	**1063**	0	1382	743	**2126**
S-4	40	46	66.05	2642	3038	1030	**6711**	5284	6077	2061	**13421**
S-5	0	42	103.71	0	4356	0	**4356**	0	8712	0	**8712**
S-6	0	0	95.36	0	0	0	**0**	0	0	0	**0**
S-7	0	0	98.86	0	0	0	**0**	0	0	0	**0**
S-8	0	0	79.00	0	0	0	**0**	0	0	0	**0**
S-9	0	0	51.26	0	0	0	**0**	0	0	0	**0**
S-10	0	0	69.46	0	0	0	**0**	0	0	0	**0**
S-11	12	35	87.31	1048	3056	995	**5099**	2095	6112	1991	**10198**
S-12	42	174	51.73	2173	9001	155	**11329**	4345	18002	310	**22658**
S-13	21	171	64.58	1356	11043	1175	**13575**	2712	22086	2351	**27149**
S-14	0	115	90.26	0	10380	3358	**13738**	0	20760	6715	**27475**
TOTAL	**115**	**606**		**7219**	**41565**	**7302**	**56085**	**14437**	**83130**	**14603**	**112171**

SUMMARY			ORE TO OB RATIO
PARTICULAR	**ORE**	**DEVELOP MENT**	
TONNAGE	230000	112171	**0.49**
VOLUMETRIC	65714	56085	**0.85**
TONS / CU.M	230000	56085	**0.24**

ANNEXURE - 8(C)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA
DEVELOPMENT & PRODUCTION FOR THE 3 RD YEAR

ORE

SECTION	AREA (Sq.m)	SECTIONAL INFLU	VOLUME (Cu.m) 90% Recoveary	TONNAGE (Bulk Density-3.50 t/Cu.m)	At 45% Cut- off Grade		
					Fe	SiO2	Al2O3
S-1	0	32.97	0	**0**	0.00	0.00	0.00
S-2	69	28.41	1764	**6175**	60.92	6.28	5.55
S-3	167	30.05	4517	**15808**	48.62	26.62	3.32
S-4	91	66.05	5409	**18933**	48.62	26.62	3.32
S-5	0	103.71	0	**0**	0.00	0.00	0.00
S-6	0	95.36	0	**0**	0.00	0.00	0.00
S-7	0	98.86	0	**0**	0.00	0.00	0.00
S-8	0	79.00	0	**0**	0.00	0.00	0.00
S-9	0	51.26	0	**0**	0.00	0.00	0.00
S-10	0	69.46	0	**0**	0.00	0.00	0.00
S-11	98	87.31	7701	**26953**	49.54	24.39	0.88
S-12	0	51.73	0	**0**	0.00	0.00	0.00
S-13	357	64.58	20734	**72571**	55.01	15.95	4.70
S-14	315	90.26	25589	**89560**	50.13	15.73	8.16
TOTAL	**1097**		**65714**	**230000**	**51.66**	**18.21**	**5.41**

DEVELOPMENT

SECTION	AREA (Sq.m)		SECTIONAL INFLU	VOLUME (Cu.m)			TOTAL	TONNAGE (Bulk Density-2.00 t/Cu.m)			TOTAL
	Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated	
S-1	0	0	32.97	0	0	0	**0**	0	0	0	**0**
S-2	0	21	28.41	0	597	196	**793**	0	1193	392	**1585**
S-3	7	45	30.05	210	1352	502	**2064**	421	2705	1004	**4129**
S-4	79	31	66.05	5218	2048	601	**7867**	10436	4095	1202	**15733**
S-5	0	67	103.71	0	6949	0	**6949**	0	13897	0	**13897**
S-6	0	0	95.36	0	0	0	**0**	0	0	0	**0**
S-7	0	0	98.86	0	0	0	**0**	0	0	0	**0**
S-8	0	0	79.00	0	0	0	**0**	0	0	0	**0**
S-9	0	0	51.26	0	0	0	**0**	0	0	0	**0**
S-10	0	0	69.46	0	0	0	**0**	0	0	0	**0**
S-11	0	12	87.31	0	1048	856	**1903**	0	2095	1711	**3807**
S-12	66	86	51.73	3414	4449	0	**7863**	6828	8898	0	**15726**
S-13	66	15	64.58	4262	969	2304	**7535**	8525	1937	4608	**15070**
S-14	22	167	90.26	1986	15073	2843	**19902**	3971	30147	5686	**39805**
TOTAL	**240**	**444**		**15090**	**32484**	**7302**	**54876**	**30181**	**64967**	**14603**	**109751**

SUMMARY			ORE TO OB RATIO
PARTICULAR	**ORE**	**DEVELOP MENT**	
TONNAGE	230000	109751	**0.48**
VOLUMETRIC	65714	54876	**0.84**
TONS / CU.M	230000	54876	**0.24**

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA
DEVELOPMENT & PRODUCTION FOR THE 4TH YEAR

ORE

SECTION	AREA (Sq.m)	SECTIONAL INFLU	VOLUME (Cu.m) 90% Recoveary	TONNAGE (Bulk Density-3.50 t/Cu.m)	At 45% Cut- off Grade		
					Fe	SiO2	Al2O3
S-1	0	32.97	0	**0**	0.00	0.00	0.00
S-2	0	28.41	0	**0**	0.00	0.00	0.00
S-3	40	30.05	1082	**3786**	48.62	26.62	3.32
S-4	0	66.05	0	**0**	0.00	0.00	0.00
S-5	0	103.71	0	**0**	0.00	0.00	0.00
S-6	97	95.36	8341	**29194**	47.38	24.53	3.65
S-7	70	98.86	6228	**21799**	55.55	13.23	4.81
S-8	0	79.00	0	**0**	0.00	0.00	0.00
S-9	0	51.26	0	**0**	0.00	0.00	0.00
S-10	0	69.46	0	**0**	0.00	0.00	0.00
S-11	0	87.31	0	**0**	0.00	0.00	0.00
S-12	0	51.73	0	**0**	0.00	0.00	0.00
S-13	354	64.58	20575	**72013**	51.12	22.14	4.58
S-14	363	90.26	29488	**103208**	53.58	19.10	4.04
TOTAL	**924**		**65714**	**230000**	**52.13**	**20.31**	**4.22**

DEVELOPMENT

SECTION	AREA (Sq.m)		SECTIONAL INFLU	VOLUME (Cu.m)			TOTAL	TONNAGE (Bulk Density-2.00 t/Cu.m)			TOTAL
	Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated	
S-1	0	0	32.97	0	0	0	**0**	0	0	0	**0**
S-2	0	0	28.41	0	0	0	**0**	0	0	0	**0**
S-3	51	30	30.05	1533	902	120	**2554**	3065	1803	240	**5109**
S-4	0	0	66.05	0	0	0	**0**	0	0	0	**0**
S-5	0	0	103.71	0	0	0	**0**	0	0	0	**0**
S-6	0	49	95.36	0	4673	927	**5599**	0	9345	1854	**11199**
S-7	0	0	98.86	0	0	692	**692**	0	0	1384	**1384**
S-8	0	0	79.00	0	0	0	**0**	0	0	0	**0**
S-9	0	0	51.26	0	0	0	**0**	0	0	0	**0**
S-10	0	0	69.46	0	0	0	**0**	0	0	0	**0**
S-11	38	43	87.31	3318	3754	0	**7072**	6636	7509	0	**14144**
S-12	0	74	51.73	0	3828	0	**3828**	0	7656	0	**7656**
S-13	0	29	64.58	0	1873	2286	**4159**	0	3746	4572	**8318**
S-14	89	225	90.26	8033	20309	3276	**31618**	16066	40617	6553	**63236**
TOTAL	**178**	**450**		**12883**	**35338**	**7302**	**55523**	**25767**	**70676**	**14603**	**111046**

SUMMARY			ORE TO OB RATIO
PARTICULAR	**ORE**	**DEVELOPMENT**	
TONNAGE	230000	111046	**0.48**
VOLUMETRIC	65714	55523	**0.84**
TONS / CU.M	230000	55523	**0.24**

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA
DEVELOPMENT & PRODUCTION FOR THE 5TH YEAR

ORE

SECTION	AREA (Sq.m)	SECTIONAL INFLU	VOLUME (Cu.m) 90% Recoveary	TONNAGE (Bulk Density-3.50 t/Cu.m)	At 45% Cut- off Grade		
					Fe	SiO2	Al2O3
S-1	0	32.97	0	**0**	0.00	0.00	0.00
S-2	0	28.41	0	**0**	0.00	0.00	0.00
S-3	0	30.05	0	**0**	0.00	0.00	0.00
S-4	0	66.05	0	**0**	0.00	0.00	0.00
S-5	0	103.71	0	**0**	0.00	0.00	0.00
S-6	153	95.36	13131	**45959**	46.87	27.34	4.72
S-7	71	98.86	6317	**22110**	55.55	13.23	4.81
S-8	0	79.00	0	**0**	0.00	0.00	0.00
S-9	0	51.26	0	**0**	0.00	0.00	0.00
S-10	0	69.46	0	**0**	0.00	0.00	0.00
S-11	0	87.31	0	**0**	0.00	0.00	0.00
S-12	0	51.73	0	**0**	0.00	0.00	0.00
S-13	258	64.58	14991	**52469**	53.55	18.27	4.58
S-14	385	90.26	31275	**109463**	53.58	19.10	4.04
TOTAL	**867**		**65714**	**230001**	**52.42**	**19.99**	**4.37**

DEVELOPMENT

SECTION	AREA (Sq.m)		SECTIONAL INFLU	VOLUME (Cu.m)			TOTAL	TONNAGE (Bulk Density-2.00 t/Cu.m)			TOTAL
	Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated		Ferru. Shale / Phyllite / Limonitic Clay / Altered Metagabbro	BHQ / Altered BHQ	10% Waste Intercalated	
S-1	0	0	32.97	0	0	0	**0**	0	0	0	**0**
S-2	0	0	28.41	0	0	0	**0**	0	0	0	**0**
S-3	0	0	30.05	0	0	0	**0**	0	0	0	**0**
S-4	0	0	66.05	0	0	0	**0**	0	0	0	**0**
S-5	0	0	103.71	0	0	0	**0**	0	0	0	**0**
S-6	0	89	95.36	0	8487	1459	**9946**	0	16974	2918	**19892**
S-7	0	0	98.86	0	0	702	**702**	0	0	1404	**1404**
S-8	0	0	79.00	0	0	0	**0**	0	0	0	**0**
S-9	0	0	51.26	0	0	0	**0**	0	0	0	**0**
S-10	0	0	69.46	0	0	0	**0**	0	0	0	**0**
S-11	0	0	87.31	0	0	0	**0**	0	0	0	**0**
S-12	0	74	51.73	0	3828	0	**3828**	0	7656	0	**7656**
S-13	0	148	64.58	0	9558	1666	**11224**	0	19116	3331	**22447**
S-14	0	292	90.26	0	26356	3475	**29831**	0	52712	6950	**59662**
TOTAL	**0**	**603**		**0**	**48229**	**7302**	**55530**	**0**	**96458**	**14603**	**111061**

SUMMARY			ORE TO OB RATIO
PARTICULAR	**ORE**	**DEVELOP MENT**	
TONNAGE	230000	111061	**0.48**
VOLUMETRIC	65714	55530	**0.85**
TONS / CU.M	230000	55530	**0.24**

ANNEXURE - 8(F)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED

ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA (ML.No.2563)

SUMMARY OF OPENING RESERVES , EXPLOITATION AND CLOSING BALANCE FOR THE PLAN PERIOD

In Tons

SECTION	OPENING BALANCE (111,121& 122)	YEAR WISE EXPLOITATION					CLOSING BALANCE (111,121& 122)	RESOURCE		TOTAL
		1	2	3	4	5		211	333	
S-1	33338	0	0	0	0	0	33338	252784	321433	607555
S-2	99962	14605	6801	6175	0	0	72381	71593	130658	274632
S-3	214778	9087	11710	15808	3786	0	174387	0	196509	370896
S-4	609400	13108	32457	18933	0	0	544903	0	218564	763467
S-5	0	0	0	0	0	0	0	0	0	0
S-6	521467	0	0	0	29194	45959	446314	0	0	446314
S-7	1435284	0	0	0	21799	22110	1391375	0	0	1391375
S-8	1363449	0	0	0	0	0	1363449	784624	165734	2313807
S-9	0	0	0	0	0	0	0	0	0	0
S-10	602354	0	0	0	0	0	602354	50324	0	652677
S-11	489272	21727	31353	26953	0	0	409239	0	0	409239
S-12	138018	32590	4888	0	0	0	100540	20695	43345	164579
S-13	1018152	32548	37024	72571	72013	52469	751527	0	0	751527
S-14	514333	106335	105767	89560	103208	109463	0	0	0	0
TOTAL	7039807	230000	230000	230000	230000	230000	5889807	1180020	1076242	8146069

Annexure - 9(a)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA				
RECLAMATION & REHABILIATION MEASURES TO BE TAKEN FOR THE FIRST YEAR				
ITEMS	**DETAILS**	**PROPOSED AREA (Ha)**	**PROPOSED QUANTITY**	**PROPOSED EXPENDITURE (LACS)**
1	**2**	**3**	**4**	**5**
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	`	0
	(ii) Afforestation on backfilled area	-	-	0
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	0
	(iv) Pisciculture	-	-	0
	(v) Converting into water reservoir	-	-	0
	(vi) Picnic spot	-	-	0
STABILIZATION & REHABILIATION OF DUMPS (within & Out side lease)	(i) Terracing	1 Ha	1 Ha	2.00
	(ii) Pitching	-	-	0
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps (including foundation,PCC , toe walls & Garlan drainage etc...)	-	Toewall-785 mts, Garland drainage-820 mts	30.63
	iv)Garland drainage along the road	1200 mts	1200 mts	2.00
	(iv) Construction of Check dams along slope of vallies etc. (SMCD,LBCD,LWCD,BWCD,GCD etc...)	-	**For SWMP**-SMCD-3,LBCD-6,GCD-10. **For Dump**-BWCD-45,LWCD-25,LBCD-20	17.02
	(v) Construction of Settling ponds (SST,ST,RWHP etc.)	-	RWHP-5,ST-5	11.80
	(vi) Desilting of Settling ponds, channels	-	–	0
	(vii) Afforestation on dumps			
	(viii) others (Coir- Matting)	0.70	0.70	7
REHABILIATION OF BARREN AREA (Out side lease)	(i) Afforestation (Green belt building in Ha)	1.90 Ha	1.90 Ha	4.88
	(ii) others (Road Plantation in KM)	0.55 KM	0.55 KM	0.44
	Mining pit area	8.47 Ha	8.47 Ha	14.74
	Others (CEC area)			
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0
	(v) Others (Please Specify)	-		0
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-	-	0
	(v) Others (Please Specify)	-	-	0
			Total	100.51

Annexure - 9(b)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA				
RECLAMATION & REHABILIATION MEASURES TO BE TAKEN FOR THE SECOND YEAR				
ITEMS	DETAILS	PROPOSED AREA (Ha)	PROPOSED QUANTITY	PROPOSED EXPENDITURE (LACS)
1	2	3	4	5
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	`	0
	(ii) Afforestation on backfilled area	-	-	0
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	0
	(iv) Pisciculture	-	-	0
	(v) Converting into water reservoir	-	-	0
	(vi) Picnic spot	-	-	0
STABILIZATION & REHABILIATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-	0
	(ii) Pitching	-	-	0
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps (including foundation,PCC , toe walls & Garlan drainage etc...)	-	-	0
	(iv) Construction of Check dams along slope of vallies etc. (LBCD,BWCD,GCD etc...) for Dump	-	**For Dump**-BWCD-45,LWCD-25,LBCD-20	2.48
	(v) Construction of Settling ponds (SST,ST,RWHP etc.)	-		0.00
	(vi) Desilting of Settling ponds, channels	-	Maintenance	1.00
	(vii) Afforestation on dumps	-		0
	(viii) others (Coir- Matting)	-		0
REHABILIATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	0.000	0	0.00
	(ii) others (Road Plantation)	0.55 KM	0.55 KM	0.44
	Mining pit area			
	Others (CEC area)		Maintenance	2
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0
	(v) Others (Please Specify)	-		0
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0
	(v) Others (Please Specify)	-		0
			Total	15.92

Annexure - 9(c)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA				
RECLAMATION & REHABILIATION MEASURES TO BE TAKEN FOR THE THIRD YEAR				
ITEMS	DETAILS	PROPOSED AREA (Ha)	PROPOSED QUANTITY	PROPOSED EXPENDITURE (LACS)
1	2	3	4	5
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	`	0
	(ii) Afforestation on backfilled area	-	-	0
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	0
	(iv) Pisciculture	-	-	0
	(v) Converting into water reservoir	-	-	0
	(vi) Picnic spot	-	-	0
STABILIZATION & REHABILIATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-	0
	(ii) Pitching	-	-	0
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps (including foundation,PCC , toe walls & Garlan drainage etc...)	-	-	0.00
	(iv) Construction of Check dams along slope of vallies etc. (LBCD,BWCD,GCD etc...)	-	-	0
	(v) Construction of Settling ponds (SST,ST,RWHP etc.)	-	-	0.00
	(vi) Desilting of Settling ponds, channels	-	Maintenance	1.00
	(vii) Afforestation on dumps	-	-	0.00
	(viii) others (Coir- Matting)	-	-	0
REHABILIATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	-	Maintenance cost	1.00
	(ii) others (Road Plantation)	0.55 KM	0.55 KM	0.44
	Mining pit area			
	Others (CEC area)		Maintenance cost	2
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0
	(v) Others (Please Specify)	-		0
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0
	(v) Others (Please Specify)	-		0
			Total	14.44

Annexure - 9(d)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA				
RECLAMATION & REHABILIATION MEASURES TO BE TAKEN FOR THE FOURTH YEAR				
ITEMS	DETAILS	PROPOSED AREA (Ha)	PROPOSED QUANTITY	PROPOSED EXPENDITURE (LACS)
1	2	3	4	5
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	`	0.00
	(ii) Afforestation on backfilled area	-	-	0.00
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	0.00
	(iv) Pisciculture	-	-	0.00
	(v) Converting into water reservoir	-	-	0.00
	(vi) Picnic spot	-	-	0.00
STABILIZATION & REHABILIATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-	0.00
	(ii) Pitching	-	-	0.00
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps (including foundation,PCC , toe walls & Garlan drainage etc...)	-	-	0.00
	(iv) Construction of Check dams along slope of vallies etc. (LBCD,BWCD,GCD etc...)	-		0.00
	(v) Construction of Settling ponds (SST,ST,RWHP etc.)	-	Maintenance	0.50
	(vi) Desilting of Settling ponds, channels	-		0.00
	(vii) Afforestation on dumps	-		0.00
	(viii) others (Coir- Matting)	-		0.00
REHABILIATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	-	Maintenance	0.50
	(ii) others (Road Plantation)	-	Maintenance	0.50
	Mining pit area			0.00
	Others (CEC area)	-	Maintenance	2.00
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0.00
	(v) Others (Please Specify)	-		0.00
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0.00
	(v) Others (Please Specify)	-		0.00
			Total	13.50

Annexure - 9(e)

RAMDEV IRON ORE MINES OF M/s. MSPL LIMITED , ML.No.2563 ERSTWHILE OF M/s. KANHAIYALAL DUDHERIA				
RECLAMATION & REHABILIATION MEASURES TO BE TAKEN FOR THE FIFTH YEAR				
ITEMS	DETAILS	PROPOSED AREA (Ha)	PROPOSED QUANTITY	PROPOSED EXPENDITURE (LACS)
1	2	3	4	5
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	`	0
	(ii) Afforestation on backfilled area	-	-	0
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	0
	(iv) Pisciculture	-	-	0
	(v) Converting into water reservoir	-	-	0
	(vi) Picnic spot	-	-	0
STABILIZATION & REHABILIATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-	0
	(ii) Pitching	-	-	0
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps (including foundation,PCC , toe walls & Garlan drainage etc...)	-	-	0.00
	(iv) Construction of Check dams along slope of vallies etc. (LBCD,BWCD,GCD etc...)	-	-	0
	(v) Construction of Settling ponds (SST,ST,RWHP etc.)	-	-	0.00
	(vi) Desilting of Settling ponds, channels	-	Maintenance	0.50
	(vii) Afforestation on dumps	-	-	0
	(viii) others (Coir- Matting)	-	-	0
REHABILIATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	-	Maintenance	0.50
	(ii) others (Road Plantation)	-	Maintenance	0.50
	Mining pit area			0.00
	Others (CEC area)	-	Maintenance	2.00
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0
	(v) Others (Please Specify)	-		0
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	4 stations	5.00
	(ii) Water Quality	-	4 stations	
	(iii) Noise level data	-	4 stations	
	(iv) Ground Vibration	-		0
	(v) Others (Please Specify)	-		0
			Total	13.50

7.5 TIME SCHEDULE

The time schedule of various activities is given in **Table 7.2.**

Table 7.2: Schedule of implementation for Mitigation/Engineering Measures (ML No. 2563)

Type	Particulars of work	Years																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Dump & Encroached area Management																					
EID/ID	Toe wall at the toe of waste dump	√																			
	Garland drain	√																			
PTD	Toe wall at the toe of waste dump	√	√	√	√	√															
	Garland drain	√	√	√	√	√															
Encroached area as per CEC	Afforestation	√	√	√	**(IInd and IIIrd year includes gap plantation and Maintenance)**																
Surface water management																					
Gully plugs	Loose Boulder check dam (dump)	√																			
	Logwood (dump)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Brushwood (dump)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Check dams	Gabion/Wire crate check dam	√																			
	Silt trap	√																			
	Stone masonry check dam	√																			
	Loose Boulder check dam	√																			
Greenbelt development		√	√	**(IInd and IIIrd year includes gap plantation and Maintenance)**																	
Afforestation		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Avenue plantation on roads		√	√	√	**(Including gap plantation and Maintenance)**																
Environmental monitoring & watch –ward		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Note- Maintenance of all engineering and biological measures will be done in subsequent year

xxx

FLOW CHART OF ROM PROCESSING
MOBILE CRUSHING & SCREENING PLANT

Annexure - 10

150 mtph

TF4016-1D

70

118.5mtph

63.5 CSS
58%

CRPS 36

EF3606

TCHS 36 S/C

145.5 mtph

19.05 CSS

72%

40
20
10

TIO 5163

CRPS 36

EF3606

TCHS 36 SH/C

105mtph

9.53 CSS

89%

40
20
10

TIO 5163

150mtph
-10 +0

ROM used to develop plant flow

Grading	% Pass
500	100.0
300	55.0
150	34.0
80	25.0
40	16.0

Correction Factors Applied

Bulk Density 2.4 mt/m3 None

Specific Density 3.4 mt/m3 None

Ramdev Iron Ore Mine (ML No. 2563) of M/s. MSPL Ltd.
(Erstwhile lease of Kanhaiyalal Dudheria), Sandur Taluk, Ballari, Karnataka

WORKING PIT

WORKING PIT

Ramdev Iron Ore Mine (ML No. 2563) of M/s. MSPL Ltd.
(Erstwhile lease of Kanhaiyalal Dudheria), Sandur Taluk, Ballari, Karnataka

BOUNDARY PILLARS – 1, 1A & 1B

FINES STOCK

FINES STOCK

INACTIVE DUMP