



GOVERNMENT OF INDIA  
MINISTRY OF MINES  
INDIAN BUREAU OF MINES  
OFFICE OF THE REGIONAL CONTROLLER OF MINES

By Mail/SPEED POST



FAX : 080- 23371027 / 23373287  
Tel : 080-23371027 / 23375366 / 67  
Email ID: ro.bangalore@ibm.gov.in  
To: No. 279/1095/2017/BNG / 582

29, Industrial Suburb, II Stage,  
Tumkur Road, Gorguntapalya,  
Yeshwantpur,  
Bangalore- 560 022.  
Dated: 24 /10/2017

✓ M/s MSPL Limited,  
Baldota Enclave,  
Abheraj Baldota Road Hosapete -583 203,  
Bellari District,  
Karnataka State

**Sub: Approval of Mining Plan including Progressive Mine Closure Plan in respect of Swamimalai Iron Ore Mine ML No. 2559 (Auctioned Block of M/s Kartikeyas Manganese and Iron ores Private Limited) over an area of 26.71 Ha. (As per CEC) in Swamimalai Village, Sandur Taluk, Bellari District of M/s MSPL Limited submitted for approval under rule 16 of MCR, 2016 - Private/ Fresh / Forest / Cat. A - FM /Captive.**

Ref : 1. Your letter No. MSPL (SIOM)/IBM/2017-18 dated. 03.010.2017  
2. This office letter of even number dated 12.10.2017  
3. Your letter No. MSPL (SIOM)/IBM/2017-18/2 dated. 13.10.2017

Sir,

In exercise of the powers conferred by clause(b) of sub-section(2) of section 5 of the Mines and Minerals (Development & Regulation) Act, 1957 read with Govt. of India order No.S.O.445(E) dated 28.04.1987 and S.O.1857 (E) dtd.18/05/2016 and subsequent delegation of powers vide letter No.T-43014/MP/CGBM/2013 dated 25.09.2017, I hereby approve the **Mining Plan including Progressive Mine Closure Plan in respect of Swamimalai Iron Ore Mine ML No. 2559 (Auctioned Block of M/s Kartikeyas Manganese and Iron ores Private Limited)** over an area of 26.71 Ha. (As per CEC) in Swamimalai Village, Sandur Taluk, Bellari District of M/s MSPL Limited. This approval is subject to the following conditions:

1. The Mining Plan is approved without prejudice to any other laws applicable to the mine from time to time whether made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.
2. The proposals shown on the plates and /or given in the document is based on the lease map/Sketch submitted by the applicant /lessee and is applicable from the date of execution of lease.
3. It is clarified that the approval of your aforesaid Mining Plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development and Regulation) Act 1957 or the Minerals (Other than Atomic and Hydro Carbon Energy Minerals) Concession Rules, 2016 and any other laws including Forest (Conservation) Act, 1980, Environment (Protection) Act, 1986 or the rules made there under, Mines Act, 1952 and Rules & Regulations made there under.
4. Indian Bureau of Mines has not undertaken verification of the mining lease boundary on the ground and does not undertake any responsibility regarding correctness of the boundaries of the leasehold shown on the ground with reference to lease map & other plans furnished by the applicant/ lessee.
5. At any stage, if it is observed that the information furnished, data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.
6. The execution of Mining Plan shall be subjected to vacation of prohibitory orders / notices, if any.

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7. The Approval of Mining Plan is strictly confined to the proposals contained within the mining leasehold demarcated as per lease sketch given by the joint survey team constituted by the CEC and duly authenticated by the State DMG. It does not convey approval to the proposals falling outside the Mining Lease boundary.
8. The Approval of Mining Plan is without prejudice to the final order of the Hon'ble Supreme Court order dtd.18/04/2013 in W.P. No. 562/2009 and interim orders passed by the Hon'ble Supreme Court from time to time in the said W.P. Nos. 25910/2009 and 26083/2009.
9. The Approval is subject to the condition that mining operations and other allied activities shall not be extended in unbroken forest area in compliance of the Hon'ble Supreme Court order dtd. 18/04/2013 in W.P. No.562/2009.
10. The contents of Circular No: 2/2010 issued by the Chief Controller of Mines, IBM, Nagpur vide his letter No.11013/3/MP/90- CCOM Vol-VII dated 06/04/2010 shall be complied with.
11. A copy of Environment Impact Assessment and Environment Management Plan as approved by the MOEF, New Delhi in terms of Hon'ble Supreme Court order dtd. 20/04/2012 shall be submitted to this office along with a copy of their approval letter, within one month of the date of such approval.
12. Environmental Monitoring Cell of the company shall continue monitoring ambient air quality, dust fall rate, water quality, soil sample analysis and noise level measurements on various stations established for the purpose both in the core zone and buffer zone as per Department of Environment guidelines and keeping in view IBM's circular No.3/92, season wise every year or by engaging the services of an Environment Laboratory approved by MOEF/CPCB. The data so generated shall be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer on demand.
13. In case the mining lease falls within a radius of 10 kms of National Park/ sanctuary, recommendations of NBWL have to be obtained as per the Order of Hon'ble Supreme Court in I A No. 460/2004.
14. An yearly report shall be submitted to this office before 1<sup>st</sup> July of every year setting forth the extent of protective and rehabilitative works carried out as envisaged in the approved mine closure plan.
15. The Mining Plan is approved for proposals contained therein and as applicable from the date of execution of the lease for the mining activities to be carried out within the mining lease hold.
16. The Mining Plan is approved for total Mineral Reserves of 24.90 Million Tonnes of Iron ore and the proposals are valid for the following period with respective production capacity.

	Production In Tonne(ROM Iron Ore)
I	3,19,043
II	3,19,071
III	3,19,178
IV	3,19,012
V	3,19,085

**Encl:** One copy of approved Mining Plan alongwith Progressive Mine Closure Plan.

Yours faithfully,

(Pankaj Kishin Estha)  
Regional Controller of Mines  
Indian Bureau of Mines.

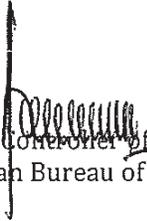
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No. 279/1095/2017/BNG

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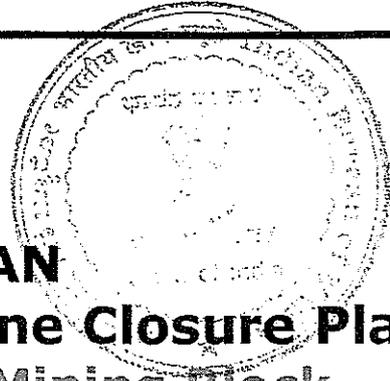
1. The Director of Mines & Geology, Govt. of Karnataka, Bangalore, along with a copy of the approved Mining.
2. The Director of Mines Safety, Directorate General of Mines Safety, Bellary Sub- Region, 31, Infantry Road, Cantonment, Bellary - 584104.
3. The Controller of Mines (SZ), Indian Bureau of Mines, Bangalore.
- ✓ 4. Shri S.Shivakumar, Qualified Person, AGM Exploration, M/s MSPL Limited, Baldota Enclave, Abheraj Baldota Road, Hosapete-583 203, Brllari District, Karnataka State
5. Mine file / Guard file

Encl: As above

  
Regional Controller of Mines  
Indian Bureau of Mines.



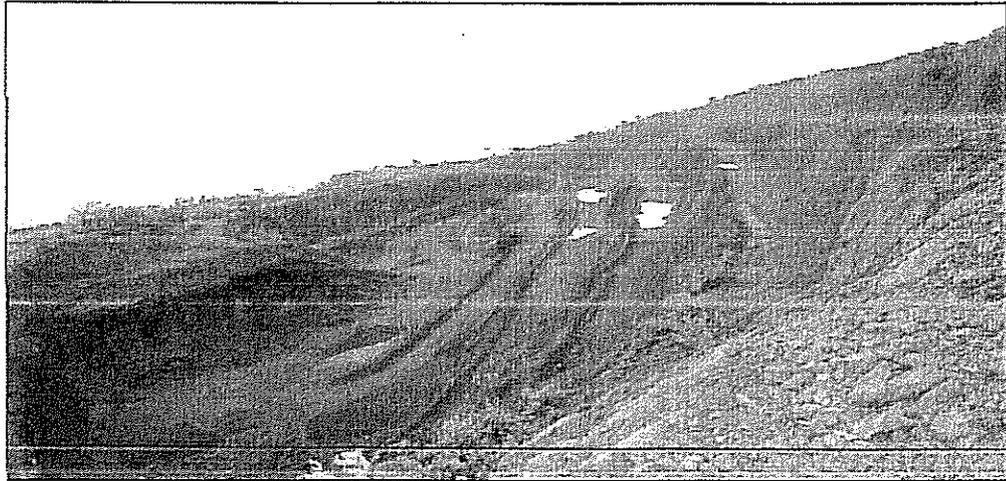
BALDOTA



# **MINING PLAN** **(Including Progressive Mine Closure Plan)**

**Swamimalai Iron Ore Mining Block**  
**M/s. Kartikeyas Manganese & Iron Ores Pvt.Ltd.**  
**ML No. 2559**

**Submitted under Rule 16(1) of MCR 2016**  
**By Preferred Bidder M/s. MSPL LIMITED**



## **Volume -1: Text & Annexures**

**ML Area: 26.71 Ha**  
**LOI : No: DMG/MLS/CCA/12/2559/2016-17/5987**  
**Dated 26 OCT 2016**  
**Opencast, Category 'A' Fully Mechanized**  
**Proposed for 'Captive Mine'**

**Total area: 26.71 Ha**  
**Forest Area: 26.71 Ha**  
**Name of the Forest: Kumaraswamy Betta Reserved Forest**  
**Reg No: IBM / 199 / 2011**

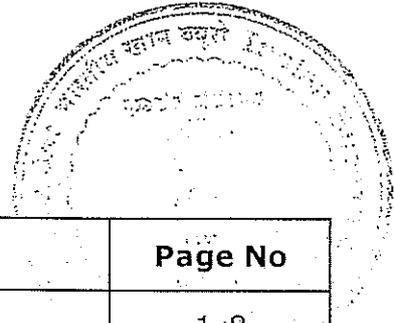
**Prepared By**

**S.Shivakumar**  
**M.Sc.Geology**

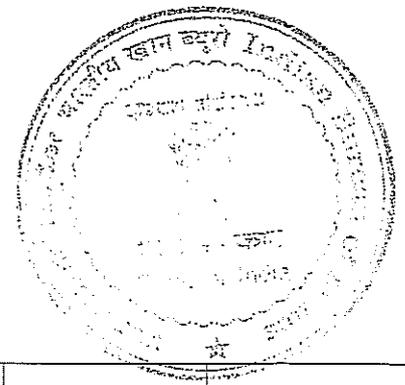
**Qualified Person**  
**October 2017**



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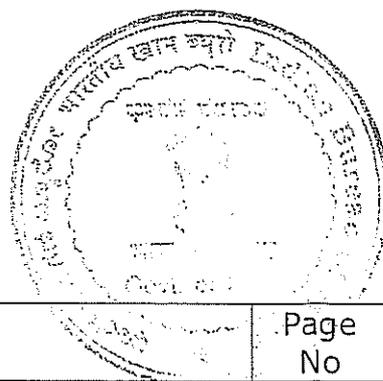
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**MSPL LIMITED**

**MINING PLAN**

**Swamimalai Iron Ore Mining Block  
(ML No 2559)**

**MINING PLAN OF**  
**SWAMIMALAI IRON ORE MINING BLOCK**

**0.0 INTRODUCTION:**

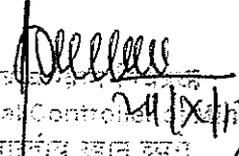
**0.1 MSPL LIMITED** is a leading mining company in Ballari - Hosapete region in private sector and engaged in mining of iron ore for last six decades. We have introduced state of art systems / method in mining. So that iron ore deposits are systematically and scientifically developed to produce iron ore. Company has setup a 1.2 MTPA of Pellet Plant at Koppal, near Hosapete.

**0.2** Swamimalai Iron Ore Mining Block of by preferred bidder M/s. MSPL Limited, erstwhile M/s. Kartikeyas Manganese & Iron Ores Pvt Ltd. (ML. No. 2559) is situated in Kumaraswamy Rage of Sandur taluk, Ballari district. Ancient Sri Kumaraswamy Temple of 8<sup>th</sup> century, protected by Archeological Survey of India, is located at around 400 m arial distance from the mine boundary.

**0.3** The extent of this block was 27.2 Ha. revenue land as per the mining lease deed and 26.71 Ha. as per the CEC sketch. The grant of the lease for a period of 20 years was notified *vide* letter No. I/592/2007-08 dated 06.10.2007, i.e. upto 05.10.2027. The mining activities were commenced in February 2008 and discontinued w.e.f. 25-07-2010 after ML has been categorised as forest land and placed it under encroachments by Lokayukta/CEC. Further the mining activities remained suspended due to Blanket Ban of mining in Karnataka by the order of the Hon'ble Supreme Court by order dated 29.07.2011 imposed complete ban on mining operations and transportations in the areas of Bellary, Chitradurga and Tumkur districts, Karnataka.

**0.4** The Hon'ble Supreme Court has directed the Government of Karnataka to formulate Reclamation & Rehabilitation Plan (R & R) for the mine affected districts viz., Ballari, Chitradurga and Tumkur. The study was entrusted to Indian Council of Forestry Research and Education (ICFRE), Dehradun, by the Government of Karnataka, *vide* letter No. DMS/MLS/R&R/2011-12, dated 27.12.2011, and the Director, Department of Mines and Geology, Bangalore *vide* letter No.DMG/MLS/R&R/2011-12/15179 dated 31.03.2012. Accordingly, the R & R Plan of category A & B mines have been prepared in the first phase and that of the category-C mines initiated in second phase.

This Mining Plan is approved subject to the conditions / stipulations indicated in the Mining Plan approval letter No. ...279/10.95/2017/BNG  
Date...24/10/17

  
Regional Controller of Mines  
भारत खनिज विभाग  
Indian Bureau of Mines,  
बंगलूर / Bangalore - 560 022



**MSPL LIMITED**

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**Swamimalai Iron Ore Mining Block  
(ML No 2559)**

**0.5** On the basis of classification of mines Hon'ble Supreme Court ordered dated 18.04.2013 C-category mines area cancelled and to go for auction of all C-category leases.

**0.6** The Central Empowered Committee (CEC) has classified the leases in different categories based on level of illegalities found. The Lease was surveyed by CEC joint team and after digitization the ML area comes to 26.71 Ha. As per CEC observations, entire lease area is forest land. Lease deed has been executed in violation of the FC Act and is invalid. 6.38 LT of iron ore was extracted illegally. Therefore, entire area under enjoyment is shown as encroachment by and categorized under "C - Category" by CEC.

**0.7** As per letters (i) No.1-26/CEC/SC/2013-Pt XXXXXIV dated 24-10-2014; (ii) 2161/CEC/SC/2003 Pt II dated 07.11.2014, the CEC of the view that before finalizing the R & R plans of any of the Category 'C' mining leases, it may be appropriate that the details of mineral reserves to be available based on the exploration data undertaken by the State Govt. Accordingly the Govt. of Karnataka has provided the exploration work to M/s. Mineral Exploration Corporation Limited (MECL), a Government of India Enterprise, Nagpur, to assess the mineral reserves in all "C" category mines in Ballari, Chitradurga and Tumkur Districts of Karnataka State.

The Mineral Exploration of India Limited (MECL) carried out detailed exploration by large scale mapping, drilling during 20.08.2014 to 30.10.2014 in Swamimalai Iron ore mining block (ML No 2559).

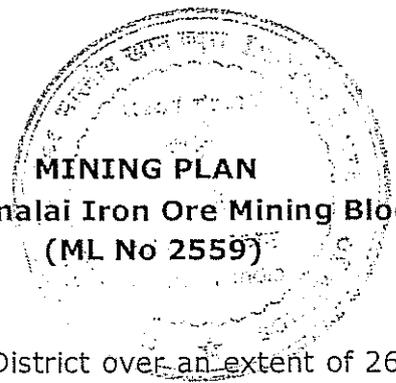
**0.8** The Commissioner & Director, Department of Mines & Geology, as per the Mines & Minerals (Development & Regulations) Amended Act, 2015 and the Mineral Auction Rules, 2015 issued the notification and notice invited tender dated 22<sup>nd</sup> December 2015 for grant of mining lease for M/s. Kartikeyas Manganese & Iron ores Pvt Ltd, ML No 2559 block. The e-auction process was conducted in accordance with the Mineral (Auction) Rules, 2015.

**0.9** The e-auction process was conducted in accordance with the mineral auction rules 2015 and the tender document for the said mineral and M/s. MSPL Limited declared as the "**Preferred Bidder**" in accordance with Rule 9(4)(b)(iii) of Mineral (Auction) Rules, 2015. The Government of Karnataka has issued a Letter of Intent with reference to e-auction dated 05.10.2016 for grant of Mining lease in ML No.



**MSPL LIMITED**

BALDOTA



**Swamimalai Iron Ore Mining Block  
(ML No 2559)**

2559 (Kumaraswamy Betta), Sandur Taluk, Ballari District over an extent of 26.71 Ha in forest land of Kumaraswamy range for a period of 50 years to MSPL Limited vide letter No. DMG/MLS/CCA/12/2559/2016-17/5987 dated 26.10.2016

**Ref: Annexure 1.**

**0.10** ICFRE has initiated the R & R plan preparation of Swamimalai Iron Ore Mine of M/s. MSPL Limited (ML No. 2559), situated in Kumaraswamy range of Sandur taluk, Ballari district, Karnataka state in association with domain experts and as well as in consultation with the district administration of Ballari district and the Department of Mines and Geology, Govt. of Karnataka. Accordingly, studies were undertaken in Swamimalai Iron Ore Mine (ML No. 2559), classified by the CEC under 'C' Category mines.

The main objectives of the study were as under:

- Preparation of R & R Plan for the mining leases that are found to be illegal mining.
- Preparation of Supplementary Environmental Management Plan (SEMP) for incorporating additional environmental safeguards in respect of the leases not found to be involved in illegal mining.
- Comprehensive environmental plan for Mining Impact Zone (MIZ) for the areas surrounding the mining leases including all the working leases and non-working leases.
- Recommending short-term and long-term management measures for maximum sustainable utilisation of the natural resources as well as area that is presently under mining and for the future exploitation.
- To delineate the level of degradation in various environmental aspects such as physical, chemical, biological and sociological aspects due to mining.
- To identify suitable site specific plan for rehabilitation and reclamation plan for the areas under degradation due to mining.
- To provide code of practices and guidelines for pollution reduction, recovery, reuse and recycle as well as develop a frame work for rehabilitation and reclamation.

To prepare the R & R Plan as per the above mentioned objectives, earlier the updated surface and other plans were provided by the lessees in case of A & B



**MSPL LIMITED**

**MINING PLAN**  
**Swamimalai Iron Ore Mining Block**  
**(ML No 2559)**

category mines. As the category 'C' mines were proposed to be auctioned, erstwhile lessees of such mines did not provide any updated documents. Accordingly, the provisional and final R & R Plan for the mine was prepared based on the provisional survey utilizing the services of approved surveyors, QPs and other experts by ICFRE, as desired by the Govt. of Karnataka and information provided by M/s. MSPL Limited.

A team of experts from ICFRE with the help of domain experts undertook a detailed field inspection of Swamimalai Iron Ore Mine (ML No. 2559) of erstwhile M/s. Kartikeyas Manganese & Iron Ores Pvt Ltd., visited on 10.07.2014 for preparation of provisional R & R and later on 26.08.2017 by the team of experts from ICFRE, accompanied by domain experts of relevant fields from reputed organizations across the country and M/s. MSPL Limited officials for final R & R preparation. The data from recent survey carried out by M/s. MSPL Limited were also considered for preparation of final R & R Plan.

The R & R Plans will thereafter be finalized by the ICFRE on behalf of the State Government and which will be considered for approval by the CEC. The lease wise MPAP prescribed in the R & R plans is decided on the basis of (a) the assessed mineral resources (b) the extent of area available for overburden dumps and (c) the infrastructure facilities available in and around the mining leases.

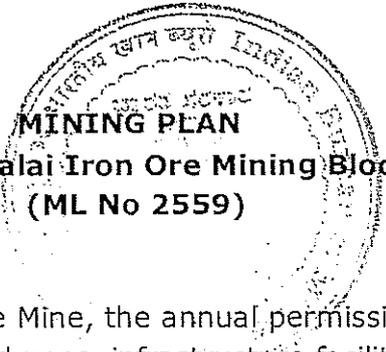
~~As per letter no-61/CEC/SC/2012-Pt II dated 20.08.2015, CEC is in view that with~~ regard to the category- C mining leases it may be appropriate that while the R & R Plans for the areas found to be under illegal mining pit / overburden dump etc. are prepared and finalized before auction, the SEMP and MPAP has been prepared and finalized by the **Preferred bidder/Lessee** provide the data to the ICFRE particularly with regard to extent, location of the identified for overburden dumps and the infrastructure facilities such as conveyor system, railway siding and slurry pipeline that are planned to be developed. The same has been conveyed by the Government of Karnataka.

Accordingly, after the e-auction preferred /successful bidder M/s. MSPL Limited conducted the survey, again a team of experts from ICFRE with the help of domain experts undertook a detailed field inspection of Swamimalai Iron Ore Mine on 26.08.2017, verified the updated surface plan. The R & R Plan of Swamimalai Iron Ore Mine of M/s. MSPL Limited (ML No. 2559) of erstwhile M/s. Kartikeyas Manganese & Iron Ores Pvt. Ltd. Of 26.71 ha. area has been prepared by ICFRE & same has been approved by CEC vide their letter F.No.2-61/CEC/SC/2017-Pt.III dated 29.09.2017 **Ref: Annexure 2.**



**MSPL LIMITED**

**Swamimalai Iron Ore Mining Block  
(ML No 2559)**



As per the approved R & R Plan of Swamimalai Iron Ore Mine, the annual permissible production limit of the mine based on reserves, waste dumps, infrastructure facilities and EC capacity have been worked to **1.16, 0.54 and 1.99 and 0.319 MTPA** respectively. Out of the above criteria, feasible production capacity based on EC i.e. **0.319 MTPA** is the lowest and the same may be considered as the permissible production capacity of the mine.

The capacity proposed may be revised, subject to the fresh EC and based on above three criteria fixed by CEC.

Further the capacity based on infrastructure is calculated as per the existing infrastructure available in the area, however if M/s. MSPL Limited (allottee of the mine) upgrade/extend the infrastructure, the capacity based on road/infrastructure may be considered for revision in due course of time.

The mining plan is being prepared in the context under Rule 16 (1) of MCR 2016, for the 5 year period.

The following items/particulars observed as per the approved R & R and also considered while preparation of Mining Plan are given below:

Table 1

SI No.	Item/Particulars	As per approved R & R Plan/Records.
1	Mining Lease	<p>1) The grant of the lease for a period of 20 years was notified vide letter No. I/592/2007-08 dated 06.10.2007 under ML No 2559.</p> <p>2) The extent of this block was 27.2 Ha revenue land as per the mining lease deed and 26.71 Ha as per the CEC sketch. The mining activities were commenced in February 2008 and discontinued w.e.f. 25-07-2010 after Lokayukta/ CEC observed that the whole of the ML is under forest land and hence has categorized it under encroachments.</p> <p>3) Ancient Sri Kumarswamy Temple of 8<sup>th</sup> century, protected by Archeological Survey of India, is located at around 400 m aerial distance from the mine boundary.</p> <p>4) This Mining Block has been auctioned by Government of Karnataka and issued a Letter of Intent for grant of Mining Block for this auctioned block over an extent of <b>26.71 Ha</b> for a period of <b>50 years</b> to the <b>MSPL Limited</b>. Vide letter No</p>



**MSPL LIMITED**

**MINING PLAN**  
**Swamimalai Iron Ore Mining Block**  
**(ML No 2559)**



		DMG/MLS/CCA/12/2559/2016-17/5987 dated:26.10.2016.
2.	Mining Plan	1) The Mining plan was prepared under Rule 22 of MCR 1960 was approved <i>vide</i> letter No. MP/BLR/Fe-68-SZ, dated 06.06.2005. 2) The Modifications in the approved Mining Plan was approved under Rule 10 of MCDR, 1988 <i>vide</i> letter No. MP/BLR/Fe-68-SZ, dated 20.10.2008. 3) The Mining Plan has to be obtained afresh by the "Preferred Bidder" to be submitted under Rule 16 (1) of MCR 2016. By considering the recent exploration MECL data provided in the tender document.
3	Environmental Clearance	The Environmental Clearance (EC) for a production of <b>3.19 Lakh TPA</b> over an area of 27.20 Ha was obtained <i>vide</i> the letter no. J-11015/283/2006-IA.II (M), dated 01-03-2007.
4	Forest Clearance	1) Forest Clearance was not obtained as the ML was initially executed in revenue land which is now claimed to be the forest land by the State Forest Department. "The entire lease area is forest land and the lease deed has been executed in violation of the FC Act and is invalid. 2) The Forest Clearance has to be obtained afresh by the "Preferred Bidder". The approach road connectivity from mines to via Subbrayanahalli-Sandur bye pass road to and towards Hosapete - Koppal for its captive consumption. M/s. MSPL Limited will take statutory clearances as per the requirement.
5	Lease Area	<b>26.71 Ha</b> in Forest land.
6	Pit	Working Pit P-1
7	Method of Working	Opencast, A - Fully Mechanized mine.
8	Production Proposed	<b>3.19 Lakh TPA</b> as per the approved R & R Plan based on Environmental Clearance (EC) capacity.
9	Waste Generation	Generation of total waste estimated as per R & R is 2062380 tons based on the cross sections prepared by ICFRE.
11	Dumps	1) The dump lying inside the ML area is found to be sub-grade ore and is being sold through e-auction, at some places waste is also dumped. 2) At present there is no area for dumping, There are 2 new



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		temporary dumps are identified within the ML area namely TD-1 & TD-2 for next plan period. It is proposed to dispose the waste in temporary dumps.
12	Reclamation & Rehabilitation measures	1) Engineering measures have been proposed based on hydrological condition within and outside the lease area along with the cost. 2) Biological measures for dumps, mine pit, haul roads have been suggested suitable species.
13	R & R Cost	<b>Rs. 83.46 Lakhs</b> Excluding cost of SMP, BMP, Monitoring and implementation of R & R capacity building, infrastructure etc.,

Table No 2

Estimated Cost Summary of the Proposed Plan for SIOM (ML 2559)\* of M/s. MSPL Limited.

SI No	Items	Total Cost in Lakhs
1	Cost of bio-engineering structures for dump management.	12.04
2	Cost of bio-engineering structures for surface water management	22.90
3	Cost of afforestation excluding greenbelt/ safety zone.	43.36
4	Cost of establishment of greenbelt/ safety zone.	4.60
5	Cost of establishment of haul road	0.56
6	Social Management Plan (SMP), Biodiversity Management Plan, Monitoring and implementation of R & R plan, capacity building, infrastructure etc.	As per the guidelines issued by CEC, in respect of "Category-C" mine, the entire amount received by way of penalty etc. may be transferred to SPV for the purpose of taking up various ameliorative and mitigative measures in district Ballari or as decided by task force to be constituted as per the recommendation of Macro-level EIA report and the direction of Hon'ble Supreme Court of India for implementation of R & R plan and EMP.
	<b>Total</b>	<b>Rs. 83.46 Lakh Excluding cost of items at serial no. 6 proposed above</b>



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\*The cost proposed of R & R is indicative and may vary based on actual dimensions of the proposed engineering structures, common schedule rate of Karnataka and local field conditions

**0.11** A fresh mining plan is prepared in the context of under Rule 16(1) of MCR 2016 for approval from IBM.

**1.0 GENERAL:**

a) Name and Address of the Applicant

Table No 3

Name of Applicant/ lessee/Rule 45 registration no.	Preferred Bidder M/s. MSPL LIMITED/ Reg.No. IBM / 199 / 2011
Address	MSPL LIMITED, Baldota Enclave, Abheraj Baldota Road,Hosapete
District	Ballari
State	Karnataka
Pin code	583 203
Phone	08394 – 232003,005
Fax	08394 -232333
Mobile No	9900256797
Email id	<a href="mailto:meda.venkataiah@mspllimited.com">meda.venkataiah@mspllimited.com</a> / <a href="mailto:email@mspllimited.com">email@mspllimited.com</a> .

b) Status of applicant/lessee: Public Limited Company.

(i)The resolution of the company, (ii) Address and ID proof of the executive director of the company, (iii) Registration certificate (iv) A copy of list of Board of Directors and address/contact numbers with e-mail id are given & is enclosed as **Annexure 3**.

c) Mineral which is included in the prospecting license (For Fresh grant):

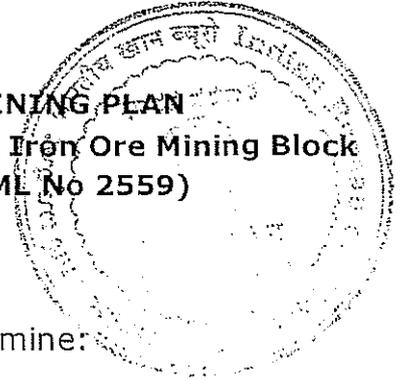
Iron ore (for Fresh grant)

d) Mineral which is included in the Letter of Intent/lease deed:



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- Iron Ore (Hematite)
- e) Mineral which is the applicant/lessee intends to mine:  
Iron ore (Hematite)
- f) Name of Qualified Person under rule 15(1) of MCR, 2016 or a Person employed under sub rule (2) of Rule 55 of MCDR, 2017 (Applicable for Scheme of Mining only) preparing Mining Plan:

Address:

Sri. S. Shivakumar

M.Sc. Geology

AGM (Exploration)

M/s MSPL Limited,

Baldota Enclave

Abheraj Baldota Road

Hosapete - 583 203

Phone: 09900256783

E-mail: [shivakumar.s@mspllimited.com](mailto:shivakumar.s@mspllimited.com)

Educational Qualification: Post Graduate in Geology

Professional Experience: 33 years after obtaining the degree.

Copies of certificates are enclosed as **Annexure 4**.

## **2.0 LOCATION AND ACCESSIBILITY**

### **a) Lease Details (Existing Mine):**

Name of mine: Swamimalai Iron Ore Mine

Lat / Long of the any boundary point:

Point 'A': (1 st pillar) : N 15° 00' 59.6", E 76° 33' 46.6"  
(Indian Bangladesh)

Date of grant of lease : LOI has been issued. Yet to be executed.

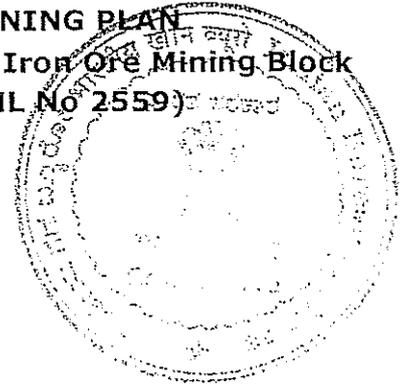
Period/Expiry Date : 50 Years / w.e.f. Date of execution

Name of Preferred bidder/lessee : M/s. MSPL LIMITED



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Postal Address:

M/s MSPL Limited,

Baldota Enclave,

Abheraj Baldota Road,

Hosapete – 583 203,

Ballari District, Karnataka,

Phone : ( 08394) 232003,

Fax : (08394) 232333,

E-mail: meda.venkataiah@mspllimited.com

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

Table No 4

Forest		Non-forest	
Kumaraswamy Betta Reserved Forest	Area (Ha): 26.71 Ha (As per CEC)	(i)waste land, (ii)grazing land, (iii)agriculture land, (iv)others (specify)	Area (Ha) : Nil

Total lease area: A fresh area 26.71 Ha (As per CEC survey) for preparation of mining plan.

District & State: Ballari & Karnataka

Taluk: Sandur Village: Swamimalai

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

Existence of public road/railway line, if any nearby and approximate distance:

Sandur-Subbrayanahalli public road is passing in western part of the lease.

Toposheet No. with latitude & longitude of all corner boundary point/ pillar: D43E8 (57 A/8), D43 K5 (57 B/5) and D43 K9 (57 B/9). Latitude & Longitudes are in datum Indian Bangladesh & WGS 84.

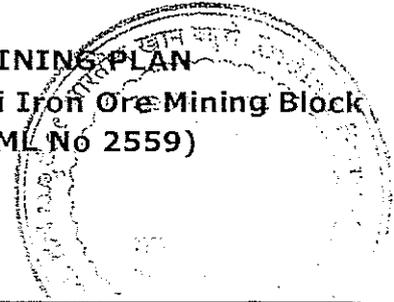


Table No 5

ML corner boundary point	INDIAN BANGLADESH		WGS 84	
	Latitude	Longitude	Latitude	Longitude
LBS-A	N 15° 00' 59.6"	E 76° 33' 46.6"	N15° 01' 04.1 "	E 76° 33' 42.9"
LBS-C	N 15° 00' 38.7"	E 76° 33' 42.4"	N15° 00' 43.2 "	E 76° 33' 38.7"
LBS-D	N 15° 00' 58.0"	E 76° 33' 44.0"	N15° 01' 02.5 "	E 76° 33' 40.3"
LBS-E	N 15° 00' 57.9"	E 76° 33' 41.4"	N15° 01' 02.4 "	E 76° 33' 37.7"
LBS-F	N 15° 00' 54.6"	E 76° 33' 34.0"	N15° 00' 59.1 "	E 76° 33' 30.3"
LBS-G	N 15° 00' 55.1"	E 76° 33' 31.2"	N15° 00' 59.6 "	E 76° 33' 27.5"
LBS-H	N 15° 00' 56.4"	E 76° 33' 27.0"	N15° 01' 00'.9"	E 76° 33' 23.3"
LBS-I	N 15° 00' 55.9"	E 76° 33' 25.2"	N15° 01' 00'.4"	E 76° 33' 21.5"
LBS-J	N 15° 00' 56.0"	E 76° 33' 22.7"	N15° 01' 00'.5"	E 76° 33' 19.0"
LBS-K	N 15° 00' 56.8"	E 76° 33' 18.4"	N15° 01' 01'.3"	E 76° 33' 14.7"
LBS-L	N 15° 00' 55.9"	E 76° 33' 16.1"	N15° 01' 00'.4"	E 76° 33' 12.4"
LBS-M	N 15° 00' 53.7"	E 76° 33' 16.8"	N15° 00' 58.2 "	E 76° 33' 13.1"

Latitude and longitude of boundary corner points will be maintained as per the rule 12(V) of MCR 2016, the CEC sketch is enclosed **Plate No I.**

**C)** Attach a general location map showing area and access routes. It is preferred that the area be marked on a Survey of India topographical map or a cadastral map or forest map as the case may be. However, if none of these are available, the area may be shown on an administrative map.

Refer Key plan **Plate No II.**



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**3.0 DETAILS OF APPROVED MINING PLAN / SCHEME OF MINING (if any)**

**3.1** Date and reference of earlier approved MP/SOM: Not Applicable

The details of earlier approved Mining Plan of erstwhile lessee of M/s. Kartikeyas Manganese & Iron Ores Pvt. Ltd. (ML No 2559) are given below: (Source: R & R Plan).

Table No 6

MP/SOM	Under MCR/MCDR	Period	Letter No. and Date of approval
Mining Plan	Under Rule 22 of MCR 1960	2005-06 to 2009-10	No.MP/BLR/Fe-68-SZ dated 06.06.2005
Modifications in the approved Mining Plan	Under Rule 10 of MCDR 1988	-	No.MP/BLR/Fe-68-SZ dated 20.10.2008

**3.2** Details of last modifications if any (for the previous approved period) of MP/SOM, indicating the date of approval, reason for modification.

Not applicable.

The modifications in the earlier approved mining plan as per R & R records.

**3.3** Review of earlier approved proposal (if any) in respect of exploration, excavation, reclamation etc.:

Not Applicable.

**3.4** Status of compliance of violations pointed out by IBM :

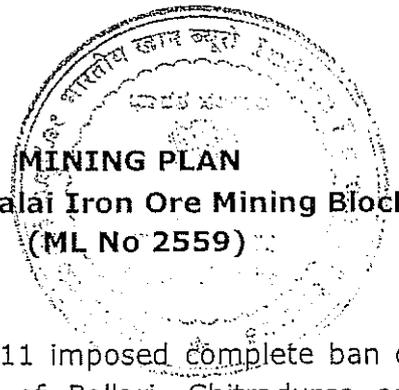
Not Applicable.

**3.5** Indicate and details of any suspension /closure / prohibitory order issued by any Government agency under any rule or Court of law :



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BALDOTA



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The Hon'ble Supreme Court by order dated 29.07.2011 imposed complete ban on mining operations and transportation in the areas of Ballari, Chitradurga and Tumkuru districts.

**3.6** In case the MP/SOM is submitted under rule 11 of the MCDR 2017 or under rule 17(3) of MCR 2016 for approval of modification, specify reason and justification for modification under these rules.

Not Applicable

**3.7 Status:**

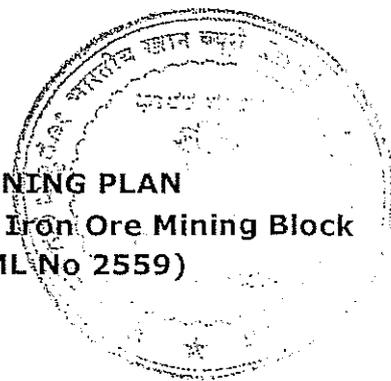
After the e-auction of two iron ore block, MSPL Limited has been declared as preferred bidder. We have conducted the survey, based on the recent survey provided by the GoK in tender document, again a team of experts from ICFRE with the help of domain experts undertook a detailed field inspection of Swamimalai Iron Ore Mine on 26.08.2017, verified the updated surface plan.

The R & R Plan of Swamimalai Iron Ore Mine of M/s. MSPL Limited (ML No. 2559) of erstwhile M/s. Kartikeyas Manganese & Iron Ores Pvt. Ltd. of 26.71 ha. area has been prepared by ICFRE & same has been approved by CEC. The proposal of reclamation and rehabilitation measures will be taken up as per the approved R & R Plan.



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## **PART – A**

### **1.0 GEOLOGY AND EXPLORATION:**

**a)** Topography, drainage pattern, vegetation, climate, rainfall data of the area applied area/mining lease area:

The mine area is covered under Survey of India topo-sheet no.57/A/12. The area has gentle slope towards south and south-west of lease area and steep slope towards north and north-eastern direction of the mine lease block. The area is hilly terrain and attains an altitude between 810 to 1088 m above M.S.L. The lease area is surrounded by forest lands. Majority of the land with-in the buffer-zone consists of hilly tract with ultimate spurs and valleys. The general hill ridges are running NNW-SSE direction.

The drainage pattern is dendritic to subdendritic with many contributing streams forming branches and trunks, which are then joined together into the sub tributaries of the main river Narihalla one of the river feeding to Tungabhadra river. Dense drainage is noticed in the entire Sandur area.

The summers are usually hot and dry in the Sandur/Hosapete area, very dry weather for a major part of the year and the temperature varies between 22°C and 43°C. ~~The climate of the area is tropical with hot and warm weather prevailing most of the year.~~ The prominent wind direction is from South West to North East. The relative humidity of the region varies from 38% to 95%.

The annual rainfall in Sandur varies from 443 mm to 1420 mm with an average rainfall of 870.7 mm. The rainfall is mostly (60.22%) confined to the period from June to September, during the south-west monsoon. During the north-east monsoon (October to November) the taluk receives 22.21% of the annual rainfall, and another 17.57% of rainfall occurs as sporadic in other months of the year.

**b)** Regional Geology with reference to the lease area:

The Ballari-Hospet region forms a part of the 'Sandur Schist Belt' referable as the "Dharwars" a group of Precambrian schistose rocks of Mysore. The lithological units include green stones which are the metamorphosed into basic igneous rocks occupying the valley regions, with phyllite-quartzites forming the canoe-shaped amphitheatre of hill, trending NNW-SSE and enclosing Sandur. The phyllites are



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locally shale and the quartzites are of the nature of banded hematite Jaspers (BHJ), and banded hematite quartzites (BHQ) , interbanded with each other. The banded hematite quartzites, the important source rocks for the iron ores in the area are prominent in the northern and western part of the ranges, where as the associated shales become prominent in the southern and eastern parts of the area. The iron ores 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, the dips are often steep being vertical in a number of places posing dips towards NE and SW are found as in the Ramandurg and NEB ranges respectively.

The general sequences of rock formations found in the area are as given below:

Soil Cover

Laterite/ Lateritised ore

Banded Ferruginous Quartzite/Jasper

Ferruginous shale and Phyllite and

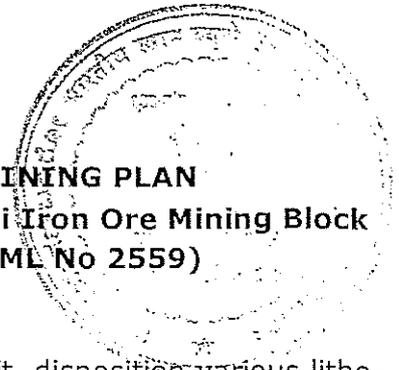
Iron ore formation

The Ballari-Hosapete region covers part of the highly folded and metamorphosed Dharwarian formations (Archean) of the Karnataka State. The hill ranges and contained valleys in the region constitute the "Sandur Synclinorium" with aerial trend of NW-SE to NNW-SSE. The strata have been tightly folded into isoclinal anticlines and synclines in the synclinorium. The weathering and denudation cycles have subsequently carved out valleys in the anticlines and hills in the syncline. The iron ore deposits of Ballari-Hosapete constitute part of Ramanadurg range of the "Sandur Synclinorium". The ore bearing localities, south of Ballari-Hosapete railway line comprises of Ramanadurg, Kumaraswamy, Donimalai, Thimmappanagudi and Devadarigudda sections along the eastern and western regions of the Sandur hills.



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c) Geology of the area, shape & size of the ore deposit, disposition various litho-units indicating structural features if any etc.,

The rock formations belong to the iron ore stage of Dharwar system. The general sequence of rock formations found in the area is as given below:

Laterite / Soil

Iron Ore (Hematite)

BHQ

Shale / Fer.Clay

Laterite / Soil: The Laterite / Soil is well exposed in the area at higher altitude. The thickness of the ferruginous laterite varies from 2 to 12, at locations as observed in the mine working pits. Ferruginous laterite observed in the area is highly porous, reddish to dull red in colour. Pebbles, boulders of ferruginous matrix are embedded in the laterite.

Iron Ore Formation: The iron formation/deposit of Swamimalai mine lease area is part of Kumaraswamy Range and it is known for its best quality. The above formation is covered by thick mantle of ferruginous laterites and banded haematite quartzite at locations. The iron ore deposit occurs in the area, in the form of reef, with Banded Ferruginous Quartzite. The strike of the iron ore is N 45° W to S 45° E to N 50° W to S 50° E with dip of 60° to 65° north east. Average strike length of ore body is 524 m is exposed. Average thickness is 36 m and depth is around 40 m. The iron ore formation occurs in the area is banded and powdery in nature, reddish brown in colour and hard metallic luster. Ore in the form of lumps and powder is also observed at some places. The quality of iron ore is good with the grade ranging from 45% to 67% Fe content.

Banded Ferruginous Quartzite (BHQ): The banded ferruginous quartzite is exposed in the area of ML block in the form of discontinuous bands at places along the hill slopes. The banded ferruginous quartzite have exposed in patches over the iron ore formation. The BHQ in the area is considered as waste due to low Fe content and exhibit, fine grained, cherry red in colour and has metallic luster.

Shale / Fer.Clay: Shale are exposed as wall rocks at places and also exposed within the iron ore formation, as intercalated waste. It is light yellow to light pinkish red in colour.



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**d)**

- (i) Name of prospecting / exploration agency : MECL
- (ii) Address: Mineral Exploration Corporation Limited, (A Government of India Enterprises)  
Dr. Babasaheb Ambedkar Bhavan, High Land Drive Road,  
Seminary Hills, NAGPUR - 4440 006
- (iii) Phone: --

**e) Details of prospecting/ exploration already carried out:**

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

There is one working pit namely P-1 with total area of 6.00 Ha was opened to extract iron ore in the lease area. It is developed at the centre of the ML, and moved towards north-west to south-east direction by forming 8 benches. The mining benches are of 5-9 m in height and 4-7 m in width and mostly intact and in good shape. The top most RL is 1046 m and bottom most RL is 985 m. The overall dimension of the pit length is 470 m, Width 150 m & depth 61 m.

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

The drilling was taken up to estimate the iron ore reserves, MECL conducted Diamond Core drilling and RC drilling involving 204.5 m (4 Bhs) and 796.0 m (13 Bhs). Total 1000.5 m (17 Bhs), 985 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.

Table No 7

Year	No of Boreholes		Meterage drilled		Total	
	Core drilling	RC drilling	Core drilling	RC drilling	No of holes	Meterage
2014-15 (20.08.2014 to 30.10.2014)	04	13	204.5	796.0	17	1000.5

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



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The details of bore holes are marked on Surface plan, Geological plan/ Cross sections. Please refer Surface plan, Geological plan and Cross section & Longitudinal section. The details of drilled boreholes by MECL is enclosed as **Annexure 5** respectively.

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

Complete chemical analysis of entire strata for all radicals were analysed at MECL laboratory by classical method. Selected samples were also analyzed at JNRDC laboratory by XRF method. (Source MECL report).

iv) Expenditure incurred in various prospecting operations.

Not Applicable.

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

The surface plan of the lease area has been prepared on a scale of 1:2000 is enclosed as **Plate No. III.**

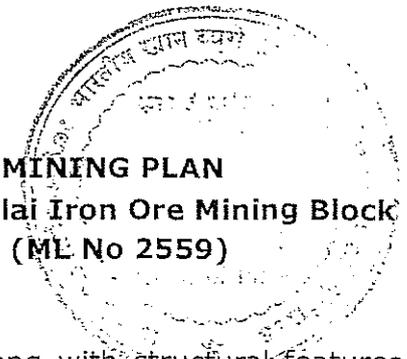
g) For preparation of geological plan, surface plan prepared on a scale of 1: 1000 or 1: 2000 scale specified under Para 1.0 (f) of Part A of the format may be taken as the base plan. The details of exploration already carried out along with supporting data for existence of mineral, locations, proposed exploration, various litho units along with structural features, mineralized/ ore zone with grade variation if any may be marked on the geological plan along with other features indicated under Rule 32(1)(b) of MCDR 2017.

After the e-auction, Preferred Bidder M/s. MSPL Limited conducted the survey, the iron ore exploration in the area was carried out systematically by diamond core drilling & RC drilling by MECL along with supporting data for existence of mineral,



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locations, proposed exploration, various litho units along with structural features, mineralized/ ore zone with grade variation if any may be marked on the geological plan.

The Geological plan of the lease area has been prepared on a scale of 1:2000 is enclosed as **Plate No IV**.

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

The Geological cross sections (CS) of the lease area has been prepared by MECL borehole data on a scale of 1:1000 is enclosed as **Plate No VA** & Longitudinal Sections (L.V) on 1:1000 is enclosed as **Plate No VB**.

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

The summary of the exploration carried out so far as explained in above para and data incorporated for preparation the mining plan. The friable iron ore mineralized area occupied in 24.59 Ha and it is covered under G1 level of exploration. By taking into consideration the future tentative excavation programme planned in southern part of main pit, south eastern side and bottom of the main pit for better assessment the exploration in the next five years is as follows: (Locations of proposed boreholes are shown on Geological plan)

Table 8

Year	No of RC Boreholes	Grid interval	Total Meterage	Remarks
1st	4	100	200	Southern Part of main Pit (PBH -1 to 4)
2nd	5	100	400	South eastern side (PBH-5 to 9)
3rd	2	100	100	Bottom of Main Pit (PBH-10 & 11)
4th	0	0	0	-
5th	0	0	0	-



j) Reserves and Resources as per UNFC with respect to the threshold value notified by IBM may be furnished in a tabular form as given below: (Area explored under different level of exploration may be marked on the geological plan and UNFC code for area considered for different categories of reserve/ resources estimation may also be marked on geological cross sections).

Submit the feasibility/Pre-feasibility study report along with the financial analysis for economic viability of the deposit as specified under the UNFC field guidelines may be incorporated.

UNFC code for categorization of reserves/resources is marked on geological plan and sections. Feasibility report along with financial analysis for economical viability to produce 0.319 MTPA is enclosed as **Annexure 6.**

k) Furnish detailed calculation of reserves/resources section wise

Updated the geological plan & cross sections the reserves/resources calculation cross section method, category wise reserves/resource are reclassified as on 01.10.2017 (Under UNFC Category) the ore & development quantities are given in **Annexure 7.**

l) Mineral-Reserves/Resources:

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

Reserves estimated by detailed exploration (G1) involves the detailed three dimensional delineation of a regular deposit achieved through sampling such as bench sampling, spot sampling, bore hole sampling and updated the geological plan & cross sectional method, the calculation of reserves/resources cross section wise, category wise reserves/resource are reclassified as on 01.10.2017 (under UNFC Category) is given below.



Table 9

Level of Exploration	Reserves/Resources in million tons (MECL)	Grade (Wt. Avg. Fe%)
G1 - Detailed exploration	Reserves (111) 16.36	55.33
	(121 & 122)	
	8.54	
	<b>Total 24.90</b>	
	Resource (211) 04.51	
	<b>Grand total 29.41</b>	
G2 - General exploration	-	-
G3 - Prospecting	-	-
G4 - Reconnaissance	-	-

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

Entire lease area has been explored fully. All the samples were analyzed Wt.Avg. 55.33% Fe. There is no sub grade mineral.

- a) Mining Method : Open Cast Mining  
Recovery factor : 90%  
Mining losses & Processing losses: 10%

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

The quality of the iron ore reserves of the lease area is having Wt.Avg.Fe is 55.33% Fe. The ultimate pit depth is proposed to work up to 886 mRL.

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

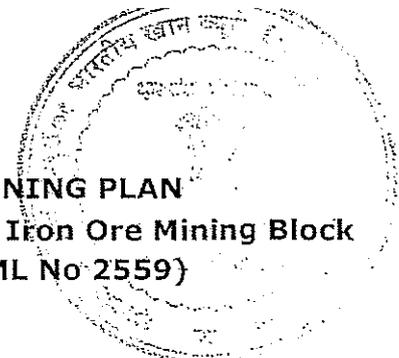
1) Geological & Net Geological Reserve have been estimated by MECL, bulk density of 3.50 t / Cu.m considered for calculation purpose. Mineable reserves have not been estimated.

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 t/ cu.m and 95%



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recovery of the net geological reserves as mineable by ICFRE, the details of reserves is as tabulated below.

Table No10  
(Quantity in Tones)

UNFC Code	Geological Reserves (MECL)	Net Geological Reserves (90% Geological Reserves by MECL)	Mineable (Reserves with the bulk density of 3.0 t/Cu.m and 95% recovery) by ICFRE
111	23510608	21159547	
121/122	8125586	7313027	
Total	31636194	28472574	23184811
Grade		Wt. Avg. 55.33%	

Based on the detailed exploration data conducted by MECL, 50 m on either side of the iron ore intersection of the borehole has been placed under (111), the next 50 m under (122). However, based on geological inference and the behavior of the iron ore formations an influence of 10-15 m along the down depth has been estimated and placed under (121) category of UNFC.

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). The reserves / resources calculation by cross section method, category wise are reclassified as on 01-10-2017 (under UNFC Category).



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Table No 11

	UNFC Code	Quantity in million tons	Grade %Fe	
<b>A. Total Mineral Reserve</b>				
Proved Mineral Reserve •	111	16.36	55.33	
Probable Mineral Reserve	121 and 122	8.54		
<b>Sub Total</b>		<b>24.90</b>		
<b>B. Total Remaining Resources</b>				
Feasibility Mineral Resource	211	4.51		
Prefeasibility Mineral Resource	221 and 222	-		
Measured Mineral Resource	331	-		
Indicated Mineral Resource	332	-		
Inferred Mineral Resource	333	-		
Reconnaissance Mineral Resource	334	-		
<b>Sub Total</b>		<b>4.51</b>		
Total Reserve (111,121,&122)+ Resources (211)		<b>29.41</b>		

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.



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## **2.0 MINING**

### **A. OPEN CAST MINING:**

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

**Existing:** Earlier lessee mining has been done by mechanized open cast method deploying heavy mining machinery like excavator and loader for extraction and loading purpose. Dumpers/tipper was used for transportation of mineral from the mine.

There is one working pit namely P-1 having a length of 470 m with an avg width of 150 m and depth of 61 m, with total area of 6.00 Ha was opened to extract iron ore in the lease area. It is developed at the centre of the ML, and moved towards north-west to south-east direction by forming 8 benches. The mining benches are of 5-9 m in height and 4-7 m in width and mostly intact and in good shape. The existing bench slope is 50-70°. The top most RL is 1046 m and bottom most RL is 985 m. The existing approach road enters from NW side of lease. The gradient of the haulage road is 1 in 20. Bench to bench road gradient is 1 in 10.

~~The operations involved mining of the ore and waste by drilling and blasting. Ore excavated from the mine was taken to the mobile crushing and screening plant in the ML area for screening and sizing. The finished products i.e. calibrated lump ore and fine ore were loaded in to tippers and dispatched to the stockyard before dispatching to domestic steel industry.~~

**Proposed:** The existing geometry of the benches are irregular, it is proposed to maintain the height of the bench is 9 m and width of bench will be 9 - 10 m with road gradient maintained at 1:16. Pit slope angle will be at 40° to 55° and bench slope angle will be 85°. 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 mRL is 985 and maximum mRL is 1046, The advance of benches will be extended towards north west to south east making pits during the first five year period.



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BALDOTA

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It is proposed to work between coordinates E 667200 to 667900 N 1660300 to 1660900 for five year plan period.

Swamimalai Iron Ore Mine is being operated by open cast mining method with high mechanization comprising of hydraulic excavators and dumpers combinations. It is proposed to work fully mechanized method of operations. The strata is softer rock, drilling requirement is very less. We will also use rock breakers, Excavators, Wheel loaders, road graders. Dumpers, tippers mobile crushing & screening plant for medium hard rock however 20 % of the excavation will be considered for drilling blasting.

**b)** Indicate year-wise tentative excavation in cubic meters indicating development, ROM, pit wise as in table below.

As per approved R & R, the production capacity has been fixed by CEC as 0.319 MTPA. Accordingly, the year wise in-situ tentative excavation is proposed for the first five years is as follows:

I. In-situ Tentative Excavation :

Table No 12

Year	Pit No.	Total Tentative Excavation (Cum)	Top Soil (Cum)	OB/SB/IB (Cum)	ROM (Cum)		Mineral Reject	ROM/Waste Ratio (in Cum)
					Ore (Cum)*	Mineral Reject (Cum)		
1	2	3	4	5	6	7	8	9
<b>I</b>	E 667200 to E 667900 N 1660300 to N 1660900	164439	-	81571	82868 (319043 tons)	-	-	1:0.98
<b>II</b>		153547	-	70671	82876 (319071 tons)	-	-	1:0.85
<b>III</b>		142059	-	59155	82904 (319178 tons)	-	-	1:0.71
<b>IV</b>		141213	-	58353	82860 (319012 tons)	-	-	1:0.70
<b>V</b>		142652	-	59773	82879 (319085 tons)	-	-	1:0.72
<b>Total</b>		743909	-	329522	414387 (1595390 tons)	-	-	1:0.80



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

Year wise section wise production and development the period I,II,III,IV & V is enclosed as **Annexure 8 (A) to 8 (E)**.

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

There is no proposal for dump re-handling (for the purpose of recovery of mineral).

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

It is proposed to work between coordinates E 667200 to 667900 N 1660300 to 1660900 for five year plan period for production and development and other allied mining activities.

Table No 13

Year	Blocks / Pits		Dumps
	Top (mRL)	Bottom (mRL)	
I	1045	1003	TD 1 & TD 2
II	1045	994	TD 1 & TD 2
III	1045	985	TD 1 & TD 2
IV	1045	985	TD 1 & TD 2
V	1045	985	TD 1 & TD 2

Yearly pit wise development plan proposed for the next five years is depicted on plans and sections. Refer **Plate No. VI A to E**. and year wise, section wise production and developments for the five years.

**I year:** It is proposed to work in main pit for ore and waste in S3, S4, S4A, S5 & S6 sections. The bottom of the RL is 1003 and top of the RL is 1045. It is proposed to maintain 9 m height, 9-10 m width and bench slope will 85°.The generated disposed on temporary dumps TD-1 and TD-2.

**II year:** It is proposed to work in main pit for ore and waste in S3, S4, S4A, S5 & S6 sections. The bottom of the RL is 994 and top of the RL is 1045. It is proposed to



maintain 9 m height, 9-10 m width and bench slope will 85°. The generated disposed on temporary dumps TD-1 and TD-2.

**III year:** It is proposed to work in main pit for ore and waste in S3, S4, S4A, S5 & S6 sections. The bottom of the RL is 985 and top of the RL is 1045. It is proposed to maintain 9 m height, 9-10 m width and bench slope will 85°. The generated disposed on temporary dumps TD-1 and TD-2.

**IV year:** It is proposed to work in main pit for ore and waste in S3, S4, S4A, S5 & S6 sections. The bottom of the RL is 985 and top of the RL is 1045. It is proposed to maintain 9 m height, 9-10 m width and bench slope will 85°. The generated disposed on temporary dumps TD-1 and TD-2.

**V year:** It is proposed to work in main pit for ore and waste in S3, S4, S4A, S5 & S6 sections. The bottom of the RL is 985 and top of the RL is 1045. It is proposed to maintain 9 m height, 9-10 m width and bench slope will 85°. The generated disposed on temporary dumps TD-1 and TD-2.

The overburden mainly consists of shale, Laterite/soil/clay, intercalated waste, dump material & BHQ is generated (329523 Cu m or 744223 tonnes i.e. 0.744 million tonnes) will be disposed on proposed dump no TD1 & TD2. The year wise waste generated is as follows:

Table No 14

Year	Volume (Cu.m)			Tons		
	Development	Intercalated waste (10%)	Total	Development (BD- 2 t/ Cu.m)	Intercalated waste (BD - 3.50 t / Cu.m)	Total
I	72363	9208	81571	144726	35449	180175
II	61463	9208	70671	122926	35452	158378
III	49943	9212	59155	99886	35464	135350
IV	49146	9207	58353	98292	35446	133738
V	50564	9209	59773	101128	35454	136582
<b>Total</b>	<b>283479</b>	<b>46044</b>	<b>329523</b>	<b>566958</b>	<b>177265</b>	<b>744223</b>



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Note: The development means side burden, over burden consists of shale, Laterite/soil/clay, dump material & BHQ. The intercalated waste means intermediate phyllite / shale bands in the mineralized friable iron ore zone.

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

Swamimalai Iron ore mine is "A" category fully mechanized mine it is proposed to operate by opencast mining method. The height of the bench is 9 m and width of bench will be 9 - 10 m with gradient maintained at 1:16. Pit slope angle will be at 40° to 55° and bench slope angle will be 85°. The present minimum mRL is 985 and maximum mRL is 1046. 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 handle the (maximum quantity) for ore and waste is considered for calculation purpose, ore is 319178 tons (82904 Cu.m) and waste is 180175 tons (81571 Cu.m) respectively is considered for Drilling, Blasting, Excavation, Hauling & Transportation of Ore & Over Burden. It is proposed to

Drilling calculation: The strata is softer rock and drilling requirement will be very less. We will also use rock breaker for medium hard rock. However, considered 20% drilling & blasting is necessary.

Ore = Burden & Spacing = 3 m X 3.5 m

Yield /m of drilling = 40.42 tons (3 x 3.5 x bulk density 3.50 tons/Cu m)

Drilling required for ore (319178\*20%=63834) = 63834/40.42 tons/cum of drilling = 1579 m+ 10% sub grade Drilling (158 m of drilling) Total meters drilling in ore = **1737 m.**

Development = Burden X Spacing = 3.5 m x 4 m

Yield /m of drilling = 28 tons (3.5x 4 x bulk density 2 tons/Cu m)

Drilling required for Development (180175\*20%=36035) =36035/28=1287+10% sub grade drilling (129) Total mt drilling in Development = **1416.**

**BLASTING:** - After Completion of drilling operation, depends on the requirement, the blasting area will be decided. In this process, normally explosives (slurry explosives, ANFO, LOX etc.,) will be filled in drilled holes and blasted by using delay detonators, card relays. We will also follow certain parameters of charge per meter



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of-drilling in different strata. It varies from 2.4 to 3.5 kg per m from strata to strata and area to area.

The maximum charge of explosives per delay is usually 100 to 150 kgs. Delay detonators / card relays are being used to maintain delay in between holes/rows. This is being done to achieve better fragmentation and to reduce ground vibrations. Muffle blasting is used to prevent fly-rock from damaging human habitats and structures. Secondary blasting is the process of blasting for further reduction of size of boulders generated during primary blasting. Rock breaker mounted on hydraulic excavator will be used to avoid plaster and pop shooting.

Explosive Required:

Ore = Drill meters x 3.5 kgs/ m = 1737 x 3.5 = 6080 kgs  
Dev = Drill meters x 2.4 kgs/ m = 1416 x 2.4 = 3399 kgs

Powder factor

Ore = 10.5 tons/kg

Development = 10.6 tons/kg

Magazine:

Presently we are not having magazine licence, it will process for grant of magazine licence, Ammonium nitrate, LOX licence etc. We will use explosives by outsource depends on requirement. Explosives are arranged from authorized dealers as and when required as per stipulated conditions.

**EXCAVATION:** After blasting, the ore/waste will be in loose/fragmented stage. MSPL will engage HEMM like, hydraulic excavators having bucket capacity ranging from 1.0 m<sup>3</sup> to 3.0 m<sup>3</sup> to excavate the loose ore/waste and loading into tippers/dumpers. These hydraulic excavators are of HSD operated and having all safety features with AC cabins. Proper care will be taken to avoid mixing of ore and waste during excavation of contact zones. We will also engage rock breakers for excavation depending on the strata.

**HAULING & TRANSPORTATION OB and ORE:** Ore and OB will be transported by using 16 Tonnes Tippers or 30 Tonnes Dumpers. We proposed an alternate route to transport the iron ore from the lease area (as per the approved R&R logistic plan).



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Ore: - Ore will be transported from blasting face to mobile crusher/stock nearer to crusher; The stock yard material will be again loaded by loaders/excavators to Tippers / Dumpers and will be fed to the crusher.

The mobile crusher will be located in lease area depends space availability, and it crushes 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 utilized for the dispatch of products from stock piles/crushers.

Waste: - Waste will be loaded by hydraulic excavators to 16 Tonne Tippers/30 Tonne Dumpers and it will be transported to the designated dump yards for systematic dumping.

Calculations:

1. Maximum quantity of the ore to be handled for the period 319178 tons (82904 Cu.m) per annum.
2. Maximum quantity for the of Waste to be handled for the period 180175 tons (81571 Cu.m) per annum

Assumptions & considerations:

1. No. of effective Mine working days -280 days
2. No. of hours working -12 hrs (2 shifts)
3. Average Capacity of Excavator -275 TPH of ore and 150 cu.mts of waste per hour (it varies depends on machine model)
4. Average drill capacity -15 m per hour (It changes depends on strata)
5. Actual working hours of machine per day - 7 hrs
6. Yield per mt of drilling: ORE-40.42 tons and WASTE -28.0 tons
7. Powder factor expected: Ore=10.5 t/Kg, OB=10.6 t/Kg.

The requirement of machinery has been calculated by considering the 80-90% availability of machinery and all parameters as discussed above is given in table.



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Table No 15

Items	No. of days	Capacity	No. of machines	No. of hours	Capacity per year	Remarks
<b>Excavators</b>						
Excavators-ore	280	275 TPH	1	6	319178 tons	
Excavators-Waste	280	275 TPH	1	6	180175 tons	Capacity per year will change year to year as per area of working
Rock breaker			1			
Excavator for Weigh bridge	280	100 TPH	1	6		To adjust weightment to 16 tonnes/10 tonnes
Excav-Crusher feeding	250	150 TPH	1	6		
Excav-Dump /Env & Misc.works		150 TPH	1	6		
Excavator-Spare			1			Stand by machineries.
Dumpers	280	30 tonners	10	6		including spare capacity
Tippers	280	16 tonners	2	6		Internal movement/other works - including spare
Drill	280	15 mts/hr	1	6	25,671 mts	
Wheel Loaders	280	150 TPH	4	6		Mine pit , stock yards & product loading
Water Tankers			4			
Mobile C&S plant	250	150 TPH	2	6	319178 tons	Design capacity is 150 TPH. 92 % of crushing capacity considered.
Road grader			1			
* Requirement of machinery calculated based on assumptions and it may change depends on practical conditions area and year.						



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As per the requirement of machinery it will be hired / capitalized for the operation of the mine.

Recovery factor: The geomorphologic setup of the iron ore deposit has been well established in this sector. The ore deposit is mostly soft and flaky in nature and hence drilling and blasting may be required except in hard ore zone. Mining has been done by open cast method deploying heavy mining machinery like ripper and dozer, excavator and loader for extraction and loading purpose. Dumpers/tippers were used for transportation of mineral from the mine. Intercalated waste cannot be sorted by machinery, hence we have considered as 90% recovery for ore, and 10% will be the mining loss & processing loss.

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

It is proposed to maintain the height of the bench is 9 m and width of bench will be than 9-10 m with gradient maintained at 1:16. Pit slope angle will be at 40° to 55° and bench slope angle will be 85°. The present RL is 985 minimum mRL & 1046 maximum mRL. 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 667200 to 667900 N 1660300 to 1660900 for five year plan period. The exploitation will be under this pit for five year plan period.

The overburden mainly consists of shale / Fer. clay, Laterite/soil/clay, intercalated waste, dump material & BHQ is generated (329523 Cu m or 744223 tonnes i.e. 0.744 million tonnes) will be disposed on proposed dump no TD1 & TD2.

At present there is no area for dumping. Two new temporary dumps have been identified within the ML area viz, TD 1 (South east corner) and TD 2 (North eastern corner) for next plan period.

**Proposed Two new temporary dump:** The details of proposed temporary dumps is tabled below:



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Table No 16

Temp Dump	Location	Height (m)	Width (m)	Angle	Area (Ha)
TD1	E 0667800 to E 0667820 N 1660315 to N1660520	40	135	28°	2.0
TD2	E 0667550 to E 0667910 N 1660510 to N1660880	40	200	28°	5.7

During the five years plan period the waste generation is 329523 Cu.m (0.329 Million Cu m) will be disposed of on above ground from lower contours towards southern slopes by retreating method in proposed temporary dump TD1 & TD 2. The proposals dumping of waste shall be done in lifts/berms each of 10 m height and width about 8 m with overall slope angle 28°, maximum height is 40 m. Yearly generation of waste and location of disposal is furnishing below.

Table No 17

Year	TD 1 (Cu .m)	TD 2 (Cu .m)	Total
	(E 0667800 to E 0667820 N 1660315 to N1660520)	(E 0667550 to E 0667910 N 1660510 to N1660880)	
<b>I</b>	24120	57451	81571
<b>II</b>	54671	16000	70671
<b>III</b>	29155	30000	59155
<b>IV</b>	28353	30000	58353
<b>V</b>	30005	29768	59773
<b>Total</b>	<b>166304</b>	<b>163219</b>	<b>329523</b>
	<b>0.166 Million Cu m</b>	<b>0.163</b>	<b>0.329</b>

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



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The conceptual mining plan has been prepared upto the life of mine by considering the following and showing the conceptual plan and sections is enclosed as **Plate No. VII.**

Anticipated life of the mine:

The updated category wise reserves and resources as on 01.10.2017 is 24.90 MMT and 4.51 MMT respectively. However at the present rate of production capacity 0.319 MTPA, the life of the mine will be 78 years. Whereas LOI issued has been for period of 50 years.

Depth persistence and feasibility of mining:

The friable iron ore deposit at this mine occurs as reef at the top of the hill. Although the depth of the deposit ranges from 30 to 90 m.

Adequacy of Exploration:

**Exploration carried out by MECL:**

Geological mapping of lease area for 26.71 Ha. A total of 17 boreholes drilled, out of which 04 boreholes for diamond core drilling and 13 boreholes for reverse circulation (RC) non core drilling, 07 geological cross sections have been prepared, bulk density considered 3.50 t/Cu m is considered for calculation purpose and the reserves were estimated and given in para 1.0 (I).

**Reclassified the reserves/resources by MSPL:**

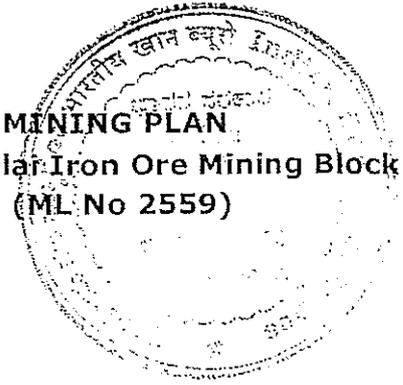
Based on the recent exploration data conducted by MECL drill data, the reserves/resources are categorized as proved reserves (111) to the lowest depth, beyond that lowest depth the reserves are categorized as probable reserves (121 & 122). Some reserves are beyond ultimate pit limit and are categorized as measured mineral resources (211). The reserves/resources are reclassified as per UNFC as on 01-10-2017.

The friable iron ore covered under G1 level of exploration. The friable iron ore mineralized area occupied in 24.59 Ha and it is covered under G1 level of exploration. By taking into consideration the future tentative excavation programme planned in next five years are given in para 1.0 (i).



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#### Production and Development:

The annual capacity of the production 0.319 MTPA as per the approved R & R plan. The ore benches are first worked and extended across and along the strike. Side burden will be removed as benches advances; first the production will be taken up in sections S3 to S6 at higher RLs. The friable ore deposit of these sections will be exploited during this five years period, and the remaining quantity will be taken for conceptual period.

For the conceptual period it is proposed to exhaust in section S3 to S6 then back filling will be taken place to reclaim the mined out area, ultimately the height and width of the benches are about 9 m & 6m, with haul road width more than 10 m with gradient maintained at 1:16. Pit slope angle is maintained at 40° to 55° and bench slopes are 85°. To win the blocked ore 4.51 MMT under 211 category additional area is required, accordingly we are requesting the state government in future.

#### Adequacy of land for Disposal of Waste:

At present there is no area for dumping. Two new temporary dumps have been identified within the ML area viz, TD 1 (South east corner) and TD 2 (North eastern corner) for next plan period. The waste generated was dumped on these proposed dumps. The overburden mainly consists of shale, Laterite/soil/clay, intercalated waste, dump material & BHQ is generated will be disposed on proposed dump no TD1,TD2 & Backfilling in mined out area for conceptual period.

The height of the dump would be maintained in such a way that individual terrace slope will not exceed 43° and overall slope would be less than 28° with the horizontal, for ensuring maximum stability.

- 1) The total generation of other waste upto the life of the mine is 3.143 Million Cum including rehandling.
- 2) The proposed temporary dump TD1 & TD2 capacity is 0.786 (0.79) Million Cu.m
- 3) The total generation of waste will not be able to accommodate in the proposed temporary dumps, the extra quantity of the waste will be back filled in the mined out area, after exhaustion of the ore.



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- 4) During the first five years plan period the total generation waste will be handled 0.329 Million Cum. It is proposed to dump TD1 & TD2.
- 5) For life of the mine the total generation waste will be handled including the rehandling of temporary waste 3.143 Million Cu.m. It is proposed to dump TD1, TD2 & backfilling.

Table No 18

(in Million Cu m)

Period	TD 1	TD 2	Total	Rehandling of TD1 & TD2	BF	Total
First five years	0.166	0.163	0.329	0	0	0
Life of mine	0.186	0.271	0.457	0.786	2.357	3.143
<b>Grand Total</b>	<b>0.352</b>	<b>0.434</b>	<b>0.786</b>	<b>0.786</b>	<b>2.357</b>	<b>3.143</b>

The proposals dumping of waste shall be done in lifts/berms each of 10 m height and width about 8 m with overall slope angle 28°, maximum height is 40 m.

#### Biological Reclamation:

Biological measure when implemented will results in the establishment of system that will be self-sustaining. As vegetation climax involves succession, any hindrance causes an imbalance in nature's operational process.

To implement biological measures all the operational activities are planned in well in time.

The entire ML area was executed as revenue land, but later it was identified by the Forest departments forest land. Hence the area is no longer under encroachment and therefore no R & R measures proposed within the lease. The allottee has to obtain FC and other statutory clearances.

#### Optimum exploitation:

For the optimum exploitation of the mineral systematic exploration, proper pit design, utilization of sub grade minerals & systematic and scientific disposal of waste generated are the governing factors, detailed exploitation programme is already



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discussed in earlier Para, for proper pit design parameters considered are, ultimate pit slope angle of 40° to 55°, and bench slope angle 85°, height and width of the benches 9m & 5-9m, road width more than 10 meters with gradient of 1:16 where as at smaller distance where two benches are required to be connected 1:10. Separate benches will formed in ore and waste.

Utilization of mineral:

The mineral produced will be used for captive consumption. The detailed specification end-use at mine & at plants are given in para 5 & 6.

Reclamation & Rehabilitation measures:

Reclamation & Rehabilitation measures will be implemented as per the approved R & R plan is enclosed as **Annexure 9 (a) to (e)**.

Landuse pattern at conceptual planning upto the lease period along with mode of rehabilitation is given below.

Table 19

DETAILS OF LANDUSE EXISTING, 1ST FIVE YEARS & CONCEPTUAL				
PARTICULARS	AREA (Ha)			MODE OF REHABILITATION
	EXISTING	1ST FIVE YEARS	CONCEPTUAL	
Area under Mining (Excluding broken safety zone), Including backfilling area - 7.35 Ha)	6.00	10.00	18.53	Bench Plantation
Temporary Dumps (TD1+TD2) Excluding safety zone area	4.74	7.70	0.00	
Roads ( Excluding within the pit, dump & safety zone)	0.74	0.38	0.38	Avenue Plantation
Infrastructure	0.10	0.61	3.49	Plantation
Area for Sub-grade stock (sub-grade already	0.85	0.00	0.00	



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lifted through e-auction)				
Safety Zone (7.5 m)	1.79	1.79	1.79	Plantation
Unused area	12.49	6.23	2.52	Will remain same
<b>Total</b>	<b>26.71</b>	<b>26.71</b>	<b>26.71</b>	

**Waste management:**

To prevent dump run off during rainy season, grass seeds will be spread, gully plugs, settling pits will be constructed at critical points. It is proposed to construct at different places across the nalla gully plugs, check bunds and earthen bunds within and outside the lease as per the approved R & R plans.

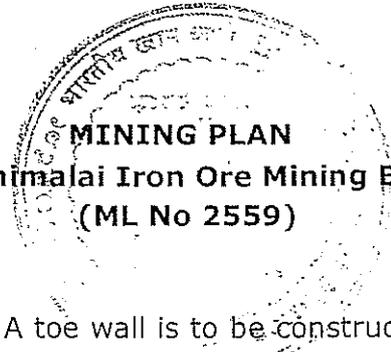
**Temporary dumps (TD-1 & TD-2):**

The dump inside the ML area is considered to be sub-grade ore and is being sold through e-auction therefore treated as the sub-grade mineral stacks. There are two sub-grade mineral stocks lying in the lease area at the northeast corner where the lease is having common boundary with M/s. MML lease (ML No. 2629). During the field visit, it was informed by the DMG official that the sub-grade ore has already been e-auctioned. This area is being earmarked for dumping waste temporarily (TD-2) after the area is cleared of sub-grade ore.

Based on the recent exploration data and ultimate pit limit of the lease area, two temporary dumping areas identified within the lease area for first five year plan period and backfilling in mined out areas including the rehandling of temporary dumps for the conceptual period.

The details of the engineering measures proposed for the management of waste dumps are TD1 & TD2

**TD1-** (2.0 Ha): Toe length of the dump is 200 m. A toe wall is to be constructed at the toe of waste dump with 1.0 to 2 m top width, 1.0 to 3 m bottom width and 0.15 to 0.6 m height constructed in hard soil mixed with boulders including hard rock, Plain cement concrete & RR stone masonry. Garland drain is to be constructed below the toe wall for a length of 210 m with 2 m top width, 1 m bottom width and 1 m height.



**TD2-** (5.70-Ha): Toe length of the dump is 250 m. A toe wall is to be constructed at the toe of waste dump with 1.0 to 2.0 m top width, 1.0 to 3 m-bottom width and 1.0 to 2 m height constructed in hard soil mixed with boulders including hard rock, Plain cement concrete & RR stone masonry. Garland drain is to be constructed below the toe wall for a length of 260 m with 2 m top width, 1m bottom width and 1m height.

It is proposed to construct engineering measures for dump management and surface water management as per the approved R&R plan. There is no proposal of silt settling tanks in R & R plan, since these temporary dumps will be re-handled for conceptual period. The details of engineering measures are as follows.

Table - 20: Dump Management Plan

LOCATION	TOEWALL / RETAINING WALL		GARLAND	
	DRY	MASONARY		
	TOP WIDTH - 1m	TOP WIDTH - 0.5m		TOP WIDTH - 2m
	BTM WIDTH - 3m	BTM WIDTH - 1.5m		BTM WIDTH - 1m
	Height - 2m	Height - 3m		Height - 1m
	Length (m)	Length (m)	Length (m)	
TD-1	200	0	210	
TD-2	250	0	260	
Encroached dump	60	0	0	
<b>TOTAL</b>	<b>510</b>	<b>0</b>	<b>470</b>	

Table - 21: Surface Water Management

PARTICULAR	LBCD	GCD	RWHP	SMCD	SST	ST	BWCD	LWCD
N1	2	5	3	2	1	0	0	0
N2	0	2	1	0	0	0	0	0
<b>TOTAL</b>	<b>2</b>	<b>7</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Control of dust:**

For controlling the generation of dust during drilling and blasting, it is proposed for wet drilling to be practiced. Dust generation due to haulage of heavy earth moving machinery to be controlled by spraying of water on haulage roads, dust generation points in crushing, screening and plants. Greenbelts will be formed along hauling road side and at dump yards.



**Control on Noise:**

For controlling the noise pollution the following measures are proposed to be adopted:

- a) All HEMM are now complying with Euro II norms. For controlling the noise generated due to HEMM regular maintenance and greasing of movable parts will be adopted.
- b) While drilling wet drilling to be practiced and while blasting millisecond delay detonators will be used.
- c) At crushing & screening plants regular oiling and greasing to be carried out.
- d) Ear plugs to be supplied to all the persons working in noise prone areas. There is no continuous exposure to high noise levels.
- e) Roaster system of working will be implemented.

Prevention of water pollution:(surface water)

- a) Gully plugs/settling ponds to be constructed to prevent dump runoff during monsoon.
- b) Dump slopes will be stabilized by plantation.
- c) Desiltation of gully plugs to be carried out during dry season.

As per approved R & R plans: The runoff during heavy down pour (during high intensity rainfall) causes soil erosion. Control of erosion is important both during mining and post mining rehabilitation programme. The major objective of rehabilitation is to establish an adequate cover of vegetation to stabilize the site and control erosion. Measures to protect the soil from water erosion should carried out on watershed.

Drainage from outside catchments area above lease area must be diverted into adjoining natural channels through diversion of drains/catch water drains. Erosion control in natural channels should be controlled by constructing silt retaining and grade stabilization structures like gabion check dams, stone masonry check dams, earthen check dams, silt settling tanks and debris basins. Check dams retain silt behind it and allow the water to flow in the downstream. Due to retaining of silt, channel gradient is reduced. Reduced channel gradient reduces flow velocity and consequently silt carrying capacity of flowing water is reduced. By adopting these grades stabilizing structures the channel is converted into benches which results in



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reduction of equivalent channel gradient appreciably. This will result in better plant growth. Engineering measures is the first line of defense in controlling erosion and it helps the vegetation to come up at faster pace.

As per the above suggestion it is proposed to construct log wood check dam, brushwood check dams, loose boulder check dams, wire crate/gabion check dam, earthen check dam, rainwater harvesting pit and stone masonry will be constructed at suitable place with measurement as per the approved R & R plans.

#### Afforestation:

Afforestation of the mined out and other available areas which are not fragmented but are degraded due to mining activity is the main component of re-vegetation process to mitigate the negative impacts of the mining on environment. Afforestation may lead to restoration of the ecosystem relatively to pre-mining period.

Afforestation will be carried out as per suggestions given in the approved R & R plans. The species recommended for soil moisture conservations and slope stabilization, nitrogen fixing species for nitrogen enrichment, hydro seeding species, suitable species for OB dumps and mine pit stabilization will be planted.

#### Biodiversity Conservation Plan:

There is no plan for preserve the Biodiversity conservation.

### **B. UNDERGROUND MINING**

Not Applicable.

### **3. MINE DRAINAGE**

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

The drainage pattern is dendritic to sub-dendritic in nature . The nallas are seasonal in nature and remain dry most of the time, except during the rainfall. There are two



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seasonal-nalas in and around the ML area, Out of total, one (N1) is originating from western corner of the lease area, flowing outside the lease area and running almost parallel to the lease boundary towards south and turns the direction towards eastern side outside the lease boundary and another small nala (N2) is originating near the N-E corner of the lease boundary and joining with the previous one and finally emptying into Narihalla. Dense drainage is noticed in the entire Sandur area.

The mining operations for iron ore are located on hill top. The mine drainage is continently manageable as rain fall in the region is low . All rain waters flows down the hill slopes by way of either direct run off or percolates through strata. There are numerous seasonal water courses along hill slopes, which drain out rain water falling over the area, These water courses have water only during rains or few hours after heavy rain fall.

Since the mine located in hilly area, the ground water table is well below mine working levels. Even when iron ore mining will reach its bottom most level the situation will be same. The ground water table is 500 m, hence there like to be very little on impact on ground water regime due to mining.

**b) Indicate maximum and minimum depth of workings.**

The maximum RL is 1045 m and the minimum RL is 985 m of mine workings during the plan period. The maximum RL is 1045 m and the minimum RL is 880 m of mine workings upto the life of mine.

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

The rain water may get accumulated at lower benches, the water does not percolate within reasonable limit.

There is no ground water will be encountered in the mine pit.

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



The Ballari-Hosapete region covers part of the highly folded and metamorphosed Dharwarian formations (Archean) of the Karnataka State. The hill ranges and contained valleys in the region constitute the "Sandur Synclinorium" with aerial trend of NW-SE to NNW-SSE. The drainage pattern of the area is sub-dendritic in nature. Half of the run-off within the buffer zone drains to-wards northeast. The half part of the run-off flow towards SW. The mine drainage is conveniently manageable as rainfall in the region is low (ranges from 443 mm to 1420 mm). The rainwater run-off is guided by the hill slopes channels. The Mine is located in low rain fall hilly terrain area with average rain fall of about 870.71 mm annually. There are no major nallahs, streams or river in the buffer zone area.

Within the lease area, there are water run-offs only when it is raining. It is proposed to constructed a large number of gully plugs and bunds to arrest the water at the bottom of hills so that suspended solids carried and settled before water flows further down slopes. The quality of water overflowing these gully plugs/bunds is regularly monitored during the rainy season and except for a rare very heavy rainfall.

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

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

There is no top soil, the overburden mainly consists of shale, Laterite/soil/clay, intercalated waste, dump material & BHQ is generated will be disposed on proposed dump no TD1 & TD2. Year wise generation of wastes and location of disposal is furnishing below. Table No 22

Year	TD 1 (Cu .m) (E 0667800 to E 0667820 N 1660315 to N1660520)	TD 2 (Cu .m) (E 0667550 to E 0667910 N 1660510 to N1660880)	Total
I	24120	57451	81571
II	54671	16000	70671
III	29155	30000	59155
IV	28353	30000	58353
V	30005	29768	59773
Total	<b>166304</b>	<b>163219</b>	<b>329523</b>
	<b>0.166 Million Cu m</b>	<b>0.163</b>	<b>0.329</b>



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

Out of 26.71 Ha, 24.59 Ha area is covered under ultimate pit limit area, at present there is no area for dumping. Hence it is proposed two new purely temporary dumps have been identified within the ML area viz, TD1 (South east corner) and TD2 (North eastern corner) for next plan period. The waste generated was dumped on these proposed dumps. The details of proposed dump is explained in earlier para.

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

During the five years plan period the waste generation is 329523 Cu.m (0.329 Million Cu m) will be disposed of on above ground from lower contours towards slopes by retreating method in proposed temporary dump TD1 & TD2. The proposals dumping of waste shall be done in lifts/ berms each of 10 m height and width about 8 m with overall slope angle 28°, maximum height is 40 m.

Year wise protective measures for dumps are implemented as per the approved R & R.

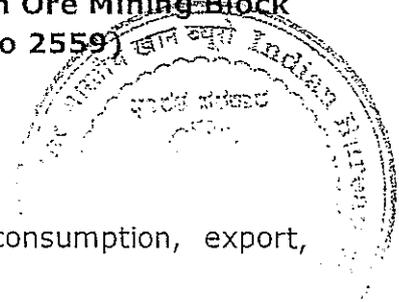
## **5.0 USE OF MINERAL AND MINERAL REJECT**

The following are to be furnished in the interest of mineral conservation.

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

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 with Wt. Avg. 55% Fe.

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



Not Applicable.

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

Not Applicable.

d) Indicate precise physical and chemical specification stipulated by buyers.

Not Applicable.

e) Give details of processes adopted to upgrade the ROM to suit the user requirement.

There is no process to upgrade the ROM at mine site. It will be upgrade in MSPL pellet plant as per the plant requirement.

## **6.0 PROCESSING OF ROM AND MINERAL REJECT**

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

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 (40mm, 20mm, & 10mm opening), with the lowest deck as 10 mm. -10 mm material from this screen is diverted to product stockpile, whereas the -20mm+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



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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.

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

Mobile crushing & screening for processing of iron ore, the plant flow sheet showing processing indicates feed quantity, grade & material balance are given as **Annexure 10.**

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

There is no tailing or reject from the processing plant.

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

There is no rejects or tailing.

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

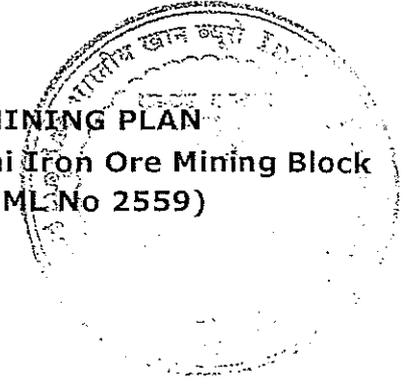
No chemicals are used in the processing plant.

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

No chemicals stored on site / plant.

**g)** Indicate quantity (Cum per day) of water required for mining and processing and sources of supply of water, disposal of water and extent of recycling. Water balance chart may be given.

There is no requirement of water in processing of ROM.



**7.0 OTHER**

Describe briefly the following:

**a) Site Services:**

Major site services are proposed at the mine are listed below.  
Workshop, Store, First Aid room, Canteen, Mine office, Computer section, etc.

**b) Employment Potential:**

Table No 23

Highly Skilled	25
Skilled	20
Semi-skilled	15
Un-skilled	10
Contract	-
Highly Skilled	-
Skilled	-
Semi skilled	-
<b>Total</b>	<b>70</b>

Statutory employment w.r.t. MMR, 1961 & MCDR, 2017 are as mentioned below

Table No 24

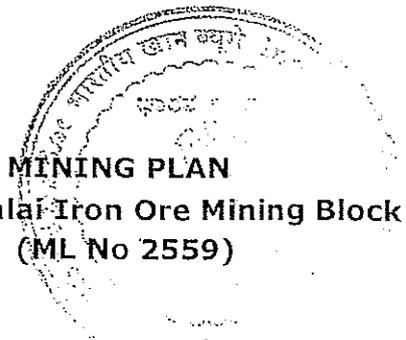
Mining Engineer	1
Geologist	1
Mines Manager	1
Asst Mines Manager	2
Mine Foreman	3
Mine Mate	6
Blasters	1
Engineers & others	5
<b>Total</b>	<b>20</b>

Indirect employment: 500 (Indirect employment will be provided as transportation



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of ore from mine to pellet plant, loading at railway siding & miscellaneous)

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

### **8.1 Environment Base line information:**

Based on the recent exploration data, ultimate pit limit, the existing land use pattern indicating the area already degraded due to mining, roads, processing plant, workshop, township etc in a tabular form.

Table No 25

<b>SI No</b>	<b>Head</b>	<b>Area (Ha)</b>
1	Area under Mining (Excluding broken safety zone)	10.00
2	Temporary Dumps (TD1+TD2) Excluding safety zone area	7.70
3	Roads ( Excluding within the pit, dump & safety zone)	0.38
4	Infrastructure	0.61
5	Area for Sub-grade stock (sub-grade already lifted through e-auction)	0.00
6	Safety Zone (7.5 m)	1.79
7	Unused area	6.23
	Total	26.71

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

### **Water Regime:**

The mine is located in low rain fall hilly terrain area with average rain fall of about 870.71 mm annually. There are no major nallahs, within the ML area. There are no



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perennial water courses within the lease or surrounding area within 10 km. Within the lease area there are water runoffs only when it is raining. The management is proposed to construct as per the approved R & R gully plugs and bunds to arrest the water at the bottom of hills so that suspended solids carried and settled before water flows further down slopes.

The quality of water overflowing these gully plugs/bunds is regularly monitored during the rainy season and except for a rare very heavy rainfall, The material accumulated behind the gully plugs and bunds is cleaned every year before monsoon.

The requirement of water for the mine will be purchased from outside. There is no acid mine drainage. Hydrological study is not required as ground water table is far below.

**Quality of Air:**

Baseline Ambient Air Quality (AAQ) monitored during 2002 for the regional EIA studies for Bellary District in all the three seasons at various monitoring stations were used for the present study to understand the variations. The annual average concentrations recorded for Suspended Particulate Matter (SPM) and Respirable Particulate Matter (RPM) for Sandur taluk are shown in the below table. The results show that the recorded values had exceeded the standards prescribed by the CPCB for annual average of 60  $\mu\text{g}/\text{m}^3$  and 120  $\mu\text{g}/\text{m}^3$  in respect of RPM for residential and industrial area respectively. Besides, the SPM concentrations for residential/rural areas and industrial areas at many locations have been found to exceed the prescribed annual average SPM of 140 and 360  $\mu\text{g}/\text{m}^3$  respectively.

Karnataka State Pollution Control Board (KSPCB) also conducted regular Ambient Air Quality (AAQ) monitoring in the mine sector Taluks at fixed monitoring sites. A mobile AAQ monitoring van was also deployed in remote areas of the Taluks. Data generated are given in below table during September-2011 by the KSPCB were considered to assess AAQ status for the study area.

It is evident from table that the maximum and minimum concentration for RSPM was recorded at Narasangpura Village, Donimalai, Sandur and Dharmapura being 60  $\mu\text{g}/\text{m}^3$  and 34  $\mu\text{g}/\text{m}^3$  which were well within the prescribed limits under NAAQS. The concentration of SO<sub>2</sub> and NO<sub>x</sub> were also within the annual average limits of 80  $\mu\text{g}/\text{m}^3$ . Air quality monitoring data of four locations - Sandur Town, Subbarayanahalli village, Yeshwanth Nagara village, and Ranjithpura conducted is provided in table.



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Ambient Air Quality data in and around the Mine areas in Sandur taluk during September 2011 (ug/m<sup>3</sup>)

Table No 26

Sl No	Date	Place of Monitoring	Time	RSPM	SO <sub>2</sub>	NO <sub>x</sub>	CO	O <sub>3</sub>
1	07.09.2011	Yeshvantanagar	6 AM to 2 PM	37.0	8.6	31.3	0.25	4.5
2	07.09.2011	Dharmapur	2 PM to 10 PM	34.0	7.4	29.6	0.22	4.4
3	08.09.2011	NMDC Township, Donimalai	6 AM to 2 PM	44.0	12.4	45.8	0.4	4.5
4	08.09.2011	Narasangpura	2 PM to 10 PM	60.0	11.1	43.4	0.4	4.8
5	08.09.2011	Bujanganagar Bye pass road	6 AM to 2 PM	34.0	10.1	35.2	0.3	4.4

Source: KSPCB, September 2011 as per approved R & R

As per the approved R & R plan it is proposed to monitor ambient air quality stations in buffer zone at two stations in Nandihalli & Subbarayanahalli villages. One station is within the core zone in Mining pit.

Ambient Noise Level:

The ambient noise quality monitoring is regularly being done at various monitoring sites by Karnataka State Pollution Control Board. The data obtained from the KSPCB for mining area in Sandur taluk for the period September 2011 along with monitoring locations are summarised in. It is evident from the table that the noise levels exceeded prescribed Leq value of 55 dB (A) during the day time in all residential areas viz., Yeshvantnagar, Dharmapura, NMDC Township, Narasangpura Village and Bujanganagar Bypass.

Table No 27

Ambient Noise Levels recorded by KSPCB during September 2011 at different locations of Sandur. (Source approved R & R Plan).

Sl No.	Date	Place of Monitoring	Time	Lmin dB(A)	Lmax dB(A)	Leq dB(A)
1	07.09.2011	Yeshvantanagar	6 AM to 2 PM	63.2	73.3	66.6
2	07.09.2011	Dharmapur	2 PM to 10 PM	53.2	62.2	58.1
3	08.09.2011	NMDC Township,	6 AM to 2 PM	52.2	62.2	62.3



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		Donimalai				
4	08.09.2011	Narasangpura	2 PM to 10 PM	53.5	62.3	61.8
5	09.09.2011	Bujanganagar Bye pass road	6 AM to 2 PM	53.3	60.1	58.4

It is proposed to monitor noise level monitoring stations two in buffer zone i.e. Nandihalli & Subbrayanahalli villages as per the approved R & R Plan, and one in core zone i.e. near mobile crushing & screening plant.

Flora: Natural vegetation

The vegetation occurring in the area belongs to Southern tropical dry deciduous forests according to Champion and Seth Classification of Forest Types of India 1968. The area falls under the mixed deciduous sub classification. According to the classification, being made by Legris and Pascal (1982), the area falls under deciduous climax forests. According to this classification, this type of forests does not have the potentiality of secondary moist deciduous forests.

It was found that the canopy is open and the majority of the trees are leafless during the dry months. The flowering and fruiting are generally far advanced before the first flush of new leaves appears with the showers in April - May.

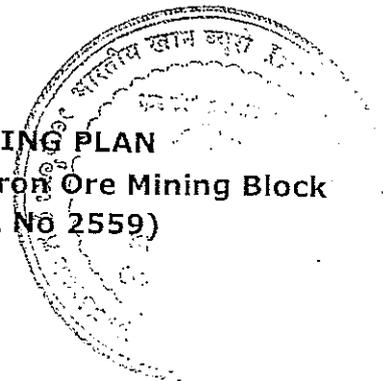
The dominant tree species found around the lease area are *Anogeissus latifolia*, *Boswellia serrata*, *Chloroxylon sweitenia*, *Schleichera oleosa*, *Wrightia arborea*, *Grewia orbiculata* and *Grewia tiliifolia*. Few climbers and twiners like *Celastrus paniculata*, *Cocculus hirsutus*, *Aristolochia indica*, *Asparagus racemosus*, *Cardiospermum halicacabum*, *Dioscorea pentaphylla*, *D. oppositifolia*, are also observed. The ground flora is chiefly seasonal. The dominant grasses include species like *Andropogon pumilus*, *Apluda mutica*, *Brachiaria eruciformis*, *Chrysopogon fulvūs*, *Cymbopogon citratus*, *C. martini*, *Cynodon dactylon*, *Heteropogon contortus* etc. chiefly occurring herbs include *Acalypha indica*, *Achyranthes aspera*, *Aerva lanata*, *Crotalaria albida*, *Bidens biternata*, *Blepharis maderaspatana*, *Justicia simplex*, *Leucas aspera*, *Cassia occidentalis*, *Leucas cephalotes* etc. *Dendrophthoe falcata* and few other species of Loranthaceae grow as parasites on tree branches, while *Striga asiatica* occur as root parasite associated with grasses. One Rare, Endangered and Threatened (RET) species like *Santalum album* also was observed around the ML area.



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**Climate:**

Bellary district is known for hot summer and very dry weather for a major part of the year and the temperature varies between 22°C and 43°C. The climate of the area is tropical with hot and warm weather prevailing most of the year. The predominant wind direction is from South West to North East. The relative humidity of the region varies from 38% to 95%.

**Rainfall:**

The annual rainfall in Sandur varies from 443 mm to 1420 mm with an average rainfall of 870.7mm. The rainfall is mostly (60.22%) confined to the period from June to September, during the south-west monsoon. During the north-east monsoon (October to November) the taluk receives 22.21% of the annual rainfall, and another 17.57% of rainfall occurs as sporadic in other months of the year. The monthly rainfall data for period 2001 to 2010 are presented in table. Year 2001 experienced maximum yearly rainfall of 1420.3 mm with September and October month receiving 406.2 mm and 278 mm rainfall respectively. The minimum rainfall (443.4 mm) was recorded during 2003.

Table 28

Monthly rainfall (mm) Data of Sandur Taluk during 2001-2010 (Source: Department of Mines & Geology, Ground-Water Division, Bellary district)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2001	0	0	0	144	87.4	102.4	115.4	269.6	406.2	278	14.8	2.50	1420.3
2002	0	52.5	0	1.7	137	73.3	138.7	82.1	117.2	127	3.4	0	733.3
2003	0	0	0	16.6	0	59.7	24.3	109	68	158	7.8	0	443.4
2004	0	0	0	22.4	33.2	132	135.6	69.2	168.2	68.8	5.4	0	634.8
2005	23	1	1	43.4	83.2	70	302.1	163	119.8	146.2	15.6	0	968.3
2006	0	0	17	38.8	200.4	48.3	56.4	52.6	170.2	36	49	0	668.7
2007	0	0	52	37	38	130.8	12.6	52.8	301.5	0	6	0	583.9
2008	0	1.8	158.6	19.6	52.6	87.1	39.8	134.4	315.2	95	105.6	0	1009.7
2009	0	0	0	42.4	80.5	49.6	62.7	160.6	204.7	328.8	107.6	16.4	1053.3
2010	0	0	0	61.2	110.8	90.2	104.4	316.8	127.2	156	224.8	0	1191.4
Total	23	55.3	181.8	427.1	823.1	843.8	992	1410.1	1998.2	1393.8	540	18.9	870.71
Avg	2.3	5.53	18.18	42.71	82.31	84.38	99.2	141.01	199.82	139.38	54	1.89	870.71
%	0.26	0.64	2.00	4.91	9.45	9.69	11.39	16.19	22.94	16.01	6.20	0.22	100.00



**MSPL LIMITED**

BALDOTA

**MINING PLAN**

**Swamimalai Iron Ore Mining Block  
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#### Temperature:

The summers are usually hot and dry in the Sandur/Hosapete area. The highest recorded temperature during the year is usually above 40° C in April and May. The winters are usually mild with temperature usually above 13° C during the months of December, January and February. The lowest temperature recorded was 12° C during 1991, 1996 and 2002. The April and May are hottest months when maximum temperatures are usually above 40° C while December, January & February maximum temperatures rarely exceeds 35° C and minimum temperature are usually below 17° C.

#### Relative Humidity:

The relative humidity in the area varies from season to season. The maximum humidity is above 70% throughout the year. The minimum humidity varies considerably over a wide range of 20% to 70%. The months of January to April and December every year, the minimum relative humidity recorded is usually between 20% to 30%.

#### Wind Direction and Wind Velocity:

The meteorological station at Tunghabhadra reservoir only records wind velocities but do not record wind direction. However, wind rose diagrammes for record made at 8.30 hr and 17.30 hr were available from recording stations at Bellary, 60 km away.

Wind velocities are usually below 5 km per hour except during pre-monsoon and early monsoon months. During the latter months wind velocities as high as 20 km per hour have been recorded. Wind direction except during pre-monsoon and monsoon months is from NWNWW. During the pre-monsoon and monsoon months wind direction is usually from SW - SSW.

#### Human settlements:

There are 19 villages located within 10 km radius from mining lease area. However, there is no village within 2.2 Kms of the lease area. The nearest village is Nandihalli located in NE. The population of these villages according to 2001 census ranges from 450 to 6554. Donimalai Township is the large village with population of 6554 and Nandihalli village with a population of 450 is the smallest village.



**MSPL LIMITED**

**MINING PLAN**

**Swamimalai Iron Ore Mining Block  
(ML No 2559)**

The demographic profile of the villages coming under the buffer zone of this mine lease is given below:

Table 29

VILLAGE POPULATION DATA				
Sl No	Name of Village.	Distance (Km)	Direction	Population
1	Ankamanahalli	6.00	SW	1603
2	Jiginihalli	7.90	SW	1282
3	Bommagatti	9.20	S	3281
4	Devogiri	7.20	E	--
5	Tonasigere	9.80	S	1094
6	Vitalanagar	7.90	E	833
7	Swamihalli	7.50	SE	1548
8	Ranjitpura	6.34	NE	874
9	Narsigpura	6.00	NE	1733
10	Bhujanganagar	7.60	N	4672
11	Krishna Nagar	8.90	N	4160
12	Lakshminagar	7.20	N	1316
13	Sandur	7.20	N	5257
14	Errayanahalli	7.00	S	2951
15	Yeshwanthnagar	7.90	W	5157
16	Donimalai Township	5.80	NE	6554
17	Nandihalli	2.20	NE	450
18	Ubbalagandi	10.00	NW	1280
19	Dharmapur	7.30	NW	---

Public buildings, places of worship and monuments:

The world famous Hampi ruins which is a World Heritage Site lies within 37 km of mining lease. However, the major Tungabhadra Dam lies within 36 kilometers of the lease.

There are a number of old temples in Sandur - Hosapete Town as well as in a few large villages, Sri. Kumaraswamy Temple, an ancient archeological monument protected by Ancient Monuments and Archeological sites and remains Act, 1958



**MSPL LIMITED**

**MINING PLAN**

**Swamimalai Iron Ore Mining Block  
(ML No 2559)**

under custody of the Archeological Survey of India is located at about 0.4 Kms aerial distance from the mine boundary. But none of them is declared as a monument

Indicate any sanctuary is located in the vicinity of leasehold

There is no sanctuary is located in the lease area.

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

Environmental impacts of mining have been well-documented and voluminous literature exists on this topic. The impacts of mining arises because various operations carried out during the process of mining such as digging the ground, top soil removal etc. The impacts on some of the important components of the environment are summarized below:

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

As a part of open cast mining one pit has been excavated by the erstwhile lessee and the top soil has been removed.

The mine lease area is located in the forest land. The forest areas adjoining the mine have good natural vegetation with many characteristic dry deciduous species. The landscape of this terrain has been modified to some extent due to mining activities. The disposal of waste materials has been carried out in the mine lease area in an unscientific manner, without proper backfilling of the excavated pits, resulting in erosion of the waste materials. The mining has also affected the catchment areas of a number of natural streams/nalas, which are seasonal. Erosion from the mine lease area resulted in loading of sediments (including chemical pollutants) to nearby water-body, the Tungabhadra Reservoir especially during rainy season.

The most of the area of lease is broken during mining and post-mining phases, drastic changes in landscape with landform has already take place.

Since the entire mining area is located in the forest land, the direct impact on the ecology and biodiversity is inevitable. The ecology of the mine area has been much disturbed due to mining and transportation activities. Therefore, preservation of



biodiversity of the surrounding areas, reclamation of the mined out area and proper afforestation using native species are to be taken up to restore the ecology.

The environmental monitoring stations are proposed to monitor regularly for Air, Water & Noise as per the approved R & R Plan. The locations area shown in Environment Plan. **Refer Plate No VIII.**

**ii. Air quality**

The atmospheric pollutants are hazardous to all the living organisms in the biosphere. The dust produced during mechanized opencast mining and allied activities is high and it can affect not only the human beings, but also the plants and animals around the ML area. Therefore, strict mitigation measures are absolutely essential to ensure unpolluted, clean environment and maintain sustainability of the ecosystem

The impact on ambient air quality due to mining operations is well within the prescribed limit. As per air quality monitoring carried out at stipulated as KSPCB.

As per the approved R & R plan it is proposed to monitor ambient air quality stations in buffer zone at two stations in Nandihalli & Subbarayanahalli villages. One station is within the core zone in Mining pit.

**iii. Water quality**

Since opencast mining is carried out in the lease area with generation of huge quantity of waste materials, adverse impacts on water quality are sure to arise, if proper measures are not implemented. The following adverse impacts are envisaged in respect of surface water quality:-

1. Soil erosion
2. Run-off from the working and roads

There are no water bodies and perennial water courses in the lease area. Water only flows down the slopes during and after rainfall. Water use at mine is mainly used for spraying haul roads. The quantities used were small so far and water was re-circulated with cleaning of muck occasionally.

It is proposed to monitor water quality as per the approved R & R.

**iv. Noise levels**



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It is proposed to monitor noise level monitoring stations two in buffer zone i.e. Nandihalli & Subbrayanahalli villages as per the approved R & R Plan, and one in core zone i.e. near mobile crushing & screening plant.

**v. Vibration levels (due to blasting)**

Sri. Kumaraswamy Temple, an ancient archeological monument protected by Ancient Monuments is located at about 0.4 Kms aerial distance from the mine boundary. Blasting zone is 500 m, blasting is very limited and there is no danger from blasting vibration causing any damage.

**vi. Water regime:** Ground water table in the area is around 500 m RL.

**vii. Acid mine drainage:** There is no acid mine drainage.

**viii. Surface subsidence :** Not applicable

**ix. Socio-economics**

As the basic facilities in the villages surrounding the mine area are meager, there is much scope for improving the educational facilities, health care, supply of safe drinking water and enhancing the status of women, by empowering them with education, employment and income generation, so as to bring up their status in the society.

MSPL group already adopted 18 villages in Hosapete, Sandur and Koppal taluks. The followings are provided in several villages

- 1) RO system established in several villages to provide pure drinking water.
- 2) A total 2067 toilets has been constructed in certain villages.
- 3) A total of 115 Self Help Groups for women's provided.
- 4) Computer training classes conducted and issued instruments in several villages.
- 5) Tailoring training and issued 74 sewing machines.

**x. Historical monuments etc.**



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**Swamimalai Iron Ore Mining Block**  
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There are no historical monuments in lease area or within 10 Km thereof. Except Sri. Kumaraswamy Temple, an ancient archeological monument protected by Ancient Monuments is located at about 0.4 Kms aerial distance from the mine boundary.

### **8.3 Progressive reclamation Plan:**

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

#### **8.3.1. Mined-Out Land:**

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

This is a auctioned block ML area, the existing land use and after five years land use details are furnished in **Refer Plate No IX.**

#### **8.3.2. Topsoil Management:**

There is no generation of topsoil as mining was proposed within the existing pit.

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

Not applicable.

**8.3.4. Acid mine drainage, if any and its mitigative measures.**



There is no pyrite in the ore. So there is no chances of acid mine drainage.

**8.3.5. Surface subsidence mitigation measures through back filling of mine voids or by any other means and its monitoring mechanism.**

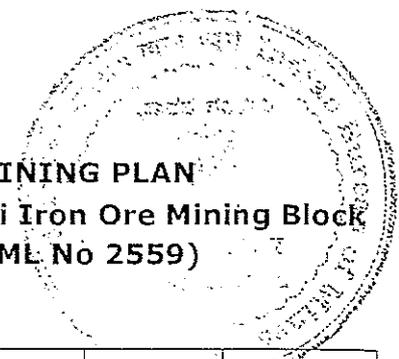
There is no back filling during the first five year plan period. The area will be reclaimed by afforestation after the life the mine.

The information on protective measures for reclamation and rehabilitation works year wise may be provided as per the following table.

Table No 30

**SUMMARY OF YEARWISE PROPOSAL FOR ITEM NO. 8.3**

Items	Details	Proposed				
		I	II	III	IV	V
Dump Management	Area Afforested (Ha)	-	-	-	-	-
	No. of Saplings Planted	-	-	-	-	-
	Cumulative no of plants	-	-	-	-	-
	Cost including watch and care during the year (lacs)	-	-	-	-	-
Management of worked out benches	Area available for rehabilitation (Ha)	-	-	-	-	-
	Afforestation done (Ha)	-	-	-	-	-
	No. of saplings planted in the year	-	-	-	-	-
	Cumulative no. of plants	-	-	-	-	-
	Any other method of rehabilitation (specify)	-	-	-	-	-
Reclamation and Rehabilitation by back filling	Cost including watch and care during the year (lacs)	-	-	-	-	-
	Void available for Back filling (L x B x D) pit wise/ stops wise	-	-	-	-	-
	Void filled by waste/tailing	-	-	-	-	-
	Afforestation on the back filled area	-	-	-	-	-
	Rehabilitation by marking water reservoir	-	-	-	-	-
Any other means (specify)	-	-	-	-	-	



Rehabilitation of waste land within lease	Area available (Ha)	-	-	-	-	-
	Area rehabilitated	-	-	-	-	-
	Method of rehabilitation	-	-	-	-	-
Others (specify)	Toe - wall (TD dumps)	100	100	100	100	110
	Gar land drain (TD dumps)	90	90	90	90	110

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

The Manager of the mine will be responsible person in case of disaster. He has a mobile phone and these numbers are displayed at the mines. Name and contact no of the person to be contacted in case of emergency is given below.

Table No 31

Name	Contact No	Nearest Hospital	Nearest Police station
P. Nagaraj	7760581122	Sandur - 8 Km	Sandur - 8 Km

In an opencast mine risk to general public ( work safety is taken care of by the Mines Act,1952 and Regulations and Rules etc. framed there under), from the following.

- Failure of external overburden dumps
- Failure of mine bench slopes.
- Fly rocks from blasting operations.
- Chemical spills.
- Fire in bulk fuel storage.
- Plying of trucks etc. on public roads
- Failure of water impounded at higher elevations.

At Swamimali there is no risk to public on account of the factors listed above, as entry of unauthorized personnel (vehicles) in to the mining and industrial areas is restricted. There is no question of any one inadvertently approaching the area, as it



is located on hill top and slopes, which do not have any pathways used by villagers. An assessment of the risk at Swamimalai Iron Ore Mine due to each of the above factors aforesaid is given below.

- i) In general, failure of external overburden dump is possible, if there are heavy rains and dumps are not stabilized. The rain fall in the area is very meager and this has not affected any of the dumps so far. The major portion of dumps will be biologically reclaimed before mining operations over.
- ii) The ore and surrounding strata is quite compact and hard. Hence benches are very stable.
- iii) The blasting is so designed that there are no fly rocks in normal situation. However, since there are no villages or bastis nearby, there is no risk from accidental fly rocks.
- iv) No chemicals are used in iron ore mining operations or beneficiation process. Hence, there is no risk involved due to chemical spills.
- v) Only 10-12 toners dumpers ply on public roads, which are essentially public roads, to carry ore to siding for dispatch. There is no traffic on these roads except that of the Swamimalai iron ore mine and other surrounding mines. Thus, there is no danger from this to public life and property.

### **8.5 Care and maintenance during temporary discontinuance:**

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

This is an auctioned block ML area, the following protective measures would be taken to deal with the unforeseen circumstances which may be created due to temporary closure of the mine.

- i) All heavy earth moving mining machinery deployed in various blocks of Swamimalai iron ore mine will be withdrawn and brought to the safe place so that



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**Swamimalai Iron Ore Mining Block  
(ML No 2559)**

these do not get buried due to bench collapse, if any, and get damaged during discontinuance. These will be subjected to preventive maintenance.

ii) The entries to the pits in various blocks will be fenced off with display of notice boards at the fence prohibiting entry into the pits by unauthorized persons.

iii) Pit boundaries would be fenced and high berms will be provided to prevent cattle's entering the pit.

iv) At the entrance and strategic points in the mine areas, sentries and watchman would be deployed to guard the sensitive/important mine area, explosive magazine and other sensitive stores and services. They would be provided with mobile phones/walk-talkies to contact mine authorities/police/fire station etc., for help during emergency.

v) The mine area would be kept well illuminated during night time.

vi) Audible warning sirens would be established at strategic points to be used during emergency so that prompt help can be received from proper sources and protective measures are immediately taken by all personnel available.

vii) Managerial, supervisory and competent persons of the mine would be engaged else where in other mines of the company as per the needs.

#### **8.6 Financial Assurance:**

The financial assurance can be submitted in any encashable form preferably a Bank Guarantee from a Scheduled Bank as stated in Rule 27(1) of Mineral Conservation and Development Rules, 2017 for five years period expiring at the end of validity of the document. The amount calculated for the purpose of Financial Assurance is based on the CCOM's Circular no.4 dated 2006 as below. The financial assurance plan is enclosed as **Plate No X**.



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

Annexure to Circular No. 4/2006

Table 32

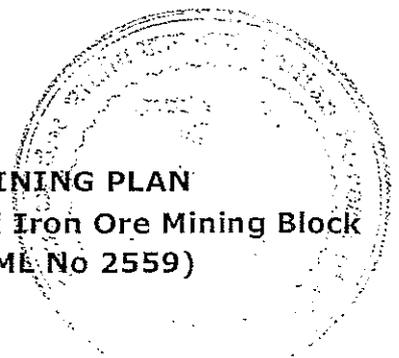
SL.No	Head	Area put on use at start of plan ( In Ha)	Additional requirement during plan period (In Ha)	Total (in Ha)	Area Considered as fully reclaimed & rehabilitated (in Ha)	Net area considered for calculation (In Ha)
		A	B	C=(A+B)	D	E=(C-D)
1	Area under mining	6.000	4.000	10.000	0.000	10.000
2	Storage for top soil	0.000	0.000	0.000	0.000	0.000
3	Waste Dump Site					
	(i) Dump (Including Temporary dumps TD1 & TD2)	4.740	2.960	7.700	0.000	7.7000
4	Mineral storage	0.850	0.000	0.000	0.000	0.000
5	Infrastructure (Workshop, administrative buildings etc.)	0.100	0.510	0.610	0.000	0.610
6	Roads	0.740	0.000	0.380	0.000	0.380
7	Railways	0.000	0.000	0.000	0.000	0.000
8	Tailing pond	0.000	0.000	0.000	0.000	0.000
9	Effluent Treatment Plant	0.000	0.000	0.000	0.000	0.000
10	Mineral Separation Plant	0.000	0.000	0.000	0.000	0.000
11	Township area	0.000	0.000	0.000	0.000	0.000
12	Others (to specify)					
	(i) 7.5 m to be left along the ML boundary	1.790	0.000	1.790	0.000	1.790
	(ii) Unused area	12.490	0.000	6.230	0.000	6.230
<b>GRAND TOTAL</b>		<b>26.710</b>	<b>7.470</b>	<b>26.710</b>	<b>0.000</b>	<b>26.710</b>



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**Swamimalai Iron Ore Mining Block  
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**Note:** The changes have been considered under each head for mining and allied activities are given in column C.

The financial assurance is not applicable under Rule 27(1) of MCDR 2017, this mining block granted through e-auction or the mining lease granted under the provisions of clause (b) or sub-clause (c) of subsection (2) of section 10 A where the Mine Development and Production Agreement has been signed between the lessee and the State Government.

This Mining Plan is approved subject to the conditions / stipulations indicated in the Mining Plan approval letter no. 279/1095/2017/BNG  
Date... 24.10.2017

*S. Shivakumar*  
**S. SHIVAKUMAR**  
M.Sc. Geology  
Qualified Person

*[Signature]*  
Regional Controller  
Indian Bureau of Mines,  
Bangalore - 560 022

\*\*\*\*\*

# 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 uri : 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 UI3100MH196PLCO12160

## CONSENT LETTER / UNDERTAKING / CERTIFICATE FROM THE APPLICANT

1. The Mining Plan in respect of Swamimalai Iron Ore Mining Block (ML No 559) over an area of 26.71 Ha (As per CEC survey) in Swamimalai range, Kumaraswamy betta P.O Sandur, Sandur taluk, District Ballari, State Karnataka, under rule 16(1) of MCR 2016 has been prepared by S.Shivakumar M.Sc. Geology.

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

M. S. Shivakumar  
GM (Exploration)  
M.Sc. Geology  
MSPL Limited,  
Baldota Enclave  
Abheraj Baldota Road  
Hosapete - 583 203  
Phone: 09900256783

E-mail: shivakumar.s@mspllimited.com

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

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



## 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, Maharashtra Karve Road, Mumbai - 400020, India.

Tel : +91 22 22030989 Fax : +91 22 22019762 Email : mspl.mum@mspllimited.com

CIN UI3100MHI96IPLCO12160

03. It is certified that the Progressive Mine Closure plan of Swamimalai iron ore mining block (ML No 2559) by Preferred Bidder M/s. MSPL Limited over an area of 26.71 ha complies with all statutory rules, Regulations, Orders Made by the Central or State Government, Statutory organisations, Court etc which have been taken in to consideration and wherever any specific permission is required the lessee will approach the concerned authorities.

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

04. "The provisions of **Mines Act, Rules and Regulations** made there under have been observed in the Mining Plan over an area of 26.71 ha (As per CEC survey) in Ballari district in Karnataka State belonging to **Swamimalai Iron Ore Mining Block**, where specific permissions are required, the applicant will approach the **D.G.M.S.** Further, standards prescribed by **D.G.M.S** in respect of **miners' health** will be strictly implemented".

05. We hereby undertake that the **Reclamation and Rehabilitation** measures will be implemented on a time bound manner as per the approved Reclamation and Rehabilitation plan by CEC of Swamimalai Iron Ore Mining Block (ML No 2559) by Preferred Bidder M/s MSPL Limited for an area of 26.71 ha in Swamimalai range, Kumaraswamy betta P.O Sandur, Sandur taluk, District Ballari, State Karnataka,

PLACE : HOSAPETE

DATE : 25-09-2017

  
Dr. Meda Venkataiah  
Whole Time Director



**CERTIFICATE FROM QUALIFIED PERSON**

The provisions of the **Mineral Conservations and Development Rules 2017** have been observed in the preparation Mining Plan for **Swamimalai Iron Ore Mining Block** (ML No 2559) over an area of 26.71 ha (As per CEC survey) by preferred Bidder M/s. MSPL Limited in Swamimalai range, Kumaraswamy betta Taluk, Sandur, Sandur taluk, District Ballari, State Karnataka and whenever specific permissions are required, the applicant will approach the concerned authorities of **Indian Bureau of Mines.**

All Plan & Section are prepared based on Lease sketch as provided by the CEC/ Government of Karnataka

The information furnished in the above Mining Plan including progressive mine closure plan is true and correct to the best of our knowledge.

*S. Shivakumar*  
S. SHIVAKUMAR  
M.Sc. Geology

PLACE: HOSAPETE  
DATE: 25-09-2017

# ANNEXURES





GOVERNMENT OF KARNATAKA

ANNEXURE 1



No:DMG/MLS/CCA/12/2559/2016-17

Office of the Commissioner and Director  
Department of Mines and Geology,  
Khanija Bhavan, Race Course Road,  
Bangalore-1 Date:26.10.2016  
Email id: [dir-mines@karnataka.gov.in](mailto:dir-mines@karnataka.gov.in)

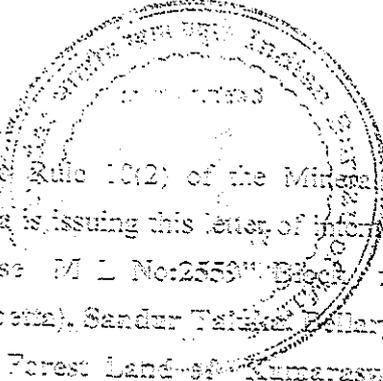
To:  
MSPL Limited,  
Baldota Bhavan, 117, Maharshi Karve Road,  
Mumbai - 400 020.

**Sub:** Letter of Intent with reference to e-auction dated 05.10.2016 for grant of iron ore mining lease for "Karthikeyas Manganese M L No:2559" Block in Swamimalai range (Kumaraswamy betta), Sandur Taluka, Bellary District over an extent of 26.71 Hectare Area of Forest Land of Kumaraswamy Range.

**Background:**

1.1. The Commissioner & 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 Mines and Minerals (Development and Regulation) Act, 1957 (the "Act") and the Mineral (Auction) Rules, 2015 (the "Rules"), issued the notification and notice inviting tender dated 22<sup>nd</sup> December 2015 for grant of mining lease for "Karthikeyas Manganese M L No: 2559" Block located in Bellary District of Karnataka (the "Tender Document"). The e-auction process was conducted in accordance with the Mineral (Auction) Rules, 2015 and the Tender Document for the said mineral block and M/s MSPL Limited was declared as the "Preferred Bidder" in accordance with Rule 9(4)(b)(iii) of the Mineral (Auction) Rules, 2015.

1.2. The upfront payment for "Karthikeyas Manganese M L No:2559" Block is Rs. 33,24,16,918/- (Rupees Thirty Three Crore Twenty Four lakhs Sixteen Thousand Nine Hundred Eighteen Only). As required under Rule 10(1) of the Mineral (Auction) Rules, 2015, M/s MSPL Limited has deposited the first instalment of the upfront payment, being ten percent of the upfront payment, of Rs 3,32,41,692/- (Rupees Three Crore Thirty Two Lakhs Forty One Thousand Six Hundred Ninety Two Only) through Demand Draft (DD) bearing No:422044 dated:18.10.2016, which was received on 21.10.2016.



2. Grant of Letter of Intent

3.1. Accordingly, pursuant to Rule 10(2) of the Mines (Auction) Rules, 2015, Government of Karnataka is issuing this letter of intent for grant of mining lease "Mantikeyas Manganesse M L No:2559" Block for iron ore in Swamima range (Kumaraswamy betta), Sandur Taluk, Chikmagalur District over an extent 26.71 Hectare Area of Forest Land of Kumaraswamy Range to M/s MSPL Limited for a period of 25 years.

3. Conditions

3.1.1. M/s MSPL Limited shall be designated as the "Successful Bidder" and subsequently be granted the mining lease only upon satisfactory completion of all the requirements under the Act, the rules made there under and the Tender Document.

3.1.2. For reference, the current requirements under the Rules and the Tender Document & declaration of M/s 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":

M/s 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 3,32,41,692/- (Rupees Three Crore Thirty Two Lakhs Forty One Thousand Six Hundred Ninety Two Only), as per the Tender Document;
- iii. furnishing the Performance Security pursuant to the Auction Rules, valid to the period specified in the Mine Development and Production Agreement (MDPA) for an amount equal to Rs. 33,24,16,918/- (Rupees Thirty Three Crore Twenty Four lakhs Sixteen Thousand Nine Hundred Eighteen 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 1.50% of the reassessed value of estimated resources 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 1.13 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;
- 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 2,93,34,088 (Rupees Two Crores Ninety Three Lakhs Thirty Four Thousand Eighty Eight Only).

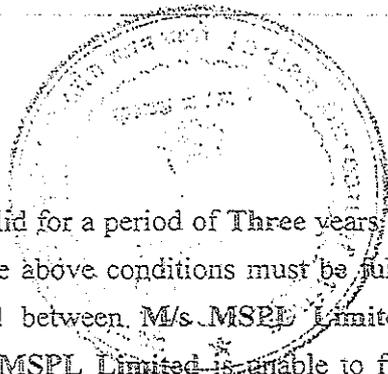
The above activities shall be completed by the Preferred Bidder in accordance with the timelines mentioned in the Tender Document.

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

M/s 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 Law for commencement of mining operations.

(c) Grant of mining lease

Subsequent to execution of the MDPA, M/s MSPL Limited shall pay the third instalment of the Upfront Payment which is Rs. 26,59,33,534 (Rupees Twenty Six Crore Fifty Nine Lakhs Thirty Three Thousand Five Hundred Thirty Four Only). Upon such payment the Government of Karnataka shall grant the mining lease to M/s MSPL Limited within a period of 30 days from the date of payment. 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.



4. **Validity**

- 4.1. This letter of intent is valid for a period of Three years 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 M/s MSPL Limited and the Government of Karnataka. In case M/s MSPL Limited is unable to fulfil all or any of the above conditions, then it may submit an application to Government of Karnataka, request for further extension. It is in the sole discretion of the Government of Karnataka to extend the validity of this letter of intent after M/s MSPL Limited submits reasons/justification for non-compliance with any of the conditions; which shall be due to events beyond the control of M/s MSPL Limited.
- 4.2. If the Government of Karnataka is satisfied that a longer period is required to enable M/s 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 M/s MSPL Limited is obligated to make Annual Payments as per the provisions of the Tender Document.

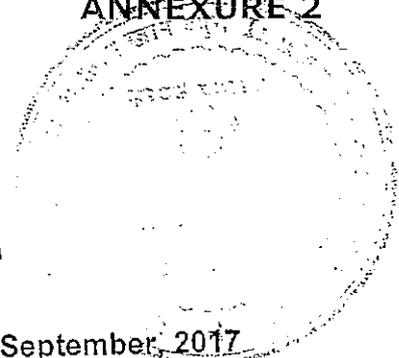
COMMISSIONER,  
Department of Mines & Geology,  
Karnataka



सत्यमेव जयते

**CENTRAL EMPOWERED COMMITTEE**  
Constituted by the Hon'ble SUPREME COURT OF INDIA

ANNEXURE 2



Dated : 29<sup>th</sup> September, 2017

F.No. 2-61/CEC/SC/2017-Pt.III

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**

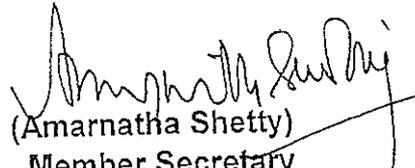
The CEC hereby gives its concurrence to the Reclamation and Rehabilitation Plan of the following mining lease, prepared through the ICFRE, by the State of Karnataka :

S.No.	Name of the Mining Lease	ML No.	Permissible annual production of Iron Ore Mine
1.	M/s. MSPL Ltd. erstwhile M/s. Karthikeyas Manganese and iron ore Pvt. Ltd., Sandur Taluk, Bellary	2559	0.319 MMT

It is requested that immediate action for the implementation of the Reclamation and Rehabilitation Plan may please be undertaken.

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.

Contd...2/-

- 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

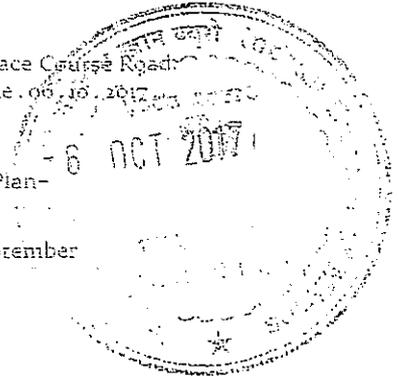
No. MC/R&R. CCA 2017-18/96 / 3009

Khanua Bhavan, Race Course Road,

Bangalore-1, date. 06.10.2017

## 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 29<sup>th</sup> September 2017.
- 2: LOI issued to the Preferred Bidder dated 26.10.2016.
- 3: Letter of Director, DMG dated 18.01.2017.



The ICFRE has submitted the final Rehabilitation & Reclamation Plan of M/s Karthikeyas Manganese and Iron Ore Pvt. Ltd 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
M/s Karthikeyas Manganese and Iron Ore Pvt. Ltd	2559	0.319 MMT

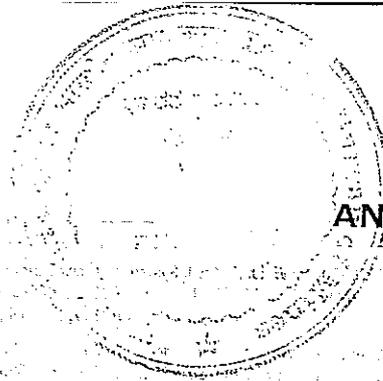
The Monitoring Committee has also been informed by the Director, Department of Mines and Geology vide reference 3 above that you have been declared as Preferred Bidder for the said mine by submitting the highest bid in the auction conducted by the Government of Karnataka. Accordingly, Letter of Intent has also been issued to you on 26.10.2016. 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 0.319 MMT.

  
Chairman,

Monitoring Committee

To,  
M/s MSPL Ltd.,  
Nehru Co-op. Colony  
Hospet - 583203.  
Copy with compliments 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.
3. Principal, Chief Conservator of Forests, Aranya Bhavana, Malleshwaram, 18<sup>th</sup> Cross, Bangalore for information and necessary action.
4. Member Secretary, KSPCB, No. 49, Parisara Bhavan, Church Street, Bangalore-560001 for information and necessary action.
5. Deputy Director General, Department of Mines Safety, No. 5, 1<sup>st</sup> Main, 100 Feet Road, Bangalore for information and necessary action.
6. Deputy Commissioner, Bellary District for information and necessary action.
7. DCF, Bellary district for information and necessary action.
8. Deputy Director, Department of Mines & Geology, Hospet for needful action.

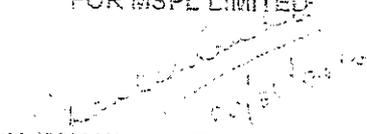


**ANNEXURE 3**

**CERTIFIED TRUE COPY EXTRACTS OF MINUTES OF MEETING OF COMMITTEE OF DIRECTORS OF MSPL LIMITED HELD ON 11<sup>th</sup> MAY 2010**

In supersession of resolution passed by the Board of Directors at the meeting held on 14<sup>th</sup> November 2009 it is hereby **RESOLVED THAT** Sri. Narendrakumar A. Baidota, Chairman and Managing Director, Sri. Ranul Kumar N. Baidota, Sri. Surenik Kumar N. Baidota, Executive Directors of the Company, Sri. Meda Venkataiah, Executive Director, Sri V. G. Subramaniam, 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:

  
(K. CHANDRA SEKHAR NAIDU)  
COMPANY SECRETARY  
ACS 16684



REPUBLIC OF INDIA



M942501R  
 BANGALORE  
 01/01/2010 23/02/2020  
 02/07/1945  
 UDAYASREE ANBARA PRADESH

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THESE ARE TO REQUEST AND  
 REQUEST IN THE NAME OF THE  
 PRESIDENT OF THE REPUBLIC  
 OF INDIA ALL HONBLE MEMB  
 AND CONSENT TO ALLOW THE  
 BEARER TO PASS FREELY  
 WITHOUT LETTING ENDORSE  
 AND TO AFFORD HIM OR HER  
 EVERY ASSISTANCE AND  
 PROTECTION OF WHICH HE OR  
 SHE MAY STAND IN NEED.

BY ORDER OF THE PRESIDENT  
 OF THE REPUBLIC OF INDIA



श्री. अमरजोती S. Amarjothi  
 क्षेत्रीय अधीक्षक  
 क्षेत्रीय पासपोर्ट कार्यालय, बंगलूर  
 Regional Passport Office, Bangalore

BANGALORE  
 01/01/2010 23/02/2020  
 02/07/1945  
 UDAYASREE ANBARA PRADESH

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Form LR.

### CERTIFICATE OF INCORPORATION

No. 28200 of 19 61-62.

I hereby certify that MEANWAL SALES INDIA LTD.

INCORPORATED under the Companies Act, 1956 (No. 1 of 1956)

is this day Incorporated under the Companies Act, 1956 (No. 1 of 1956)

and that the Company is Limited.

Given under my hand at DELHI

this SEVENTEEN day of SEPTEMBER

One thousand nine hundred and SIXTY ONE A.D. 1961



*[Signature]*  
( S. I. Singh )  
Registrar of Companies,  
Government of India.

FORM 100 (C-1032)-19-57-15,000.



No. 11-22166.

# 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 1965 the change of name of the Company.

from MINERAL SALES LIMITED (\*)

to MSPL LIMITED (\*)

and I hereby certify that MINERAL SALES LIMITED (\*)

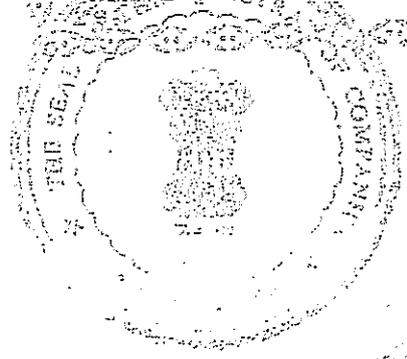
which was originally incorporated on Eighteenth day of Oct. <sup>1961</sup> under the Companies Act, 1956 and under the name MINERAL SALES PRIVATE LIMITED having duly passed the necessary resolution in terms of section 21 of the Companies Act, 1956 the name of the said Company is this day changed to

MSPL LIMITED (\*) and this certificate is issued pursuant to Section 25(1) of the said Act/

Given under my hand at MUMBAI this 18th day of December, 1965

Deputy Registrar of Companies  
MUMBAI/No. 43A.

one thousand nine hundred  
18  
(18/12/65)  
Asstt. Registrar of Companies  
Maharashtra, Mumbai.



*[Handwritten signature and notes]*  
6



**MSPL LIMITED**

Corp. Office : Balajee Enclave, Abheeraj S.I.I.Ta Road, Bangalore - 560003 Karnataka, India  
 Office : +91 8394 232002 232003 Fax: +91 8394 232004 232005  
 Email: email@msplmtd.com and www.msplmtd.com

Regd. Office : Balajee Enclave, I.I.T., Bangalore - 560003 Karnataka, India  
 Tel : +91 22 2200984 Fax : +91 22 22109762 Email: mspl@msplmtd.com  
 CIN U13100MH1961PLCO12160

Date: 08.06.2016

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

This is certify that S.Shivakumar. M Sc. Geology, has been working in Vyasankere 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)

## GULBARGA UNIVERSITY, GULBARGA

Certificate Of Passing

This is to Certify that

Shri/Smt. Shetty Shivakumar

Passed the M.Sc. Final Geology

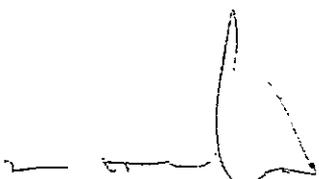
Examination held by the

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.

# GULBARGA UNIVERSITY, GULBARGA

CERTIFICATE Showing the number of marks obtained by

1020

Shetty Shivakumar

in each head of passing

If 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

Sl. No.	Subject	Maximum Marks	Minimum for Passing	Marks Obtained		Remarks
				in figs	in words	
1	Hydrogeology	75	26	51	Fifty one	First class
II	Exploration Geophysics & Geochemistry	75	26	53	Fifty three	
III	I.M.D, Ore genesis & Ore microscopy	75	26	43	Forty three	
IV	Engg. Geol., Surveying, Elem. of mining & Miner. Econ.	75	26	42	Forty two	
		—	—	—		
	Practical I Hydrogeology, Ores & 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	
	<b>Total</b>	<b>450</b>	<b>180</b>	<b>287</b>	<b>Two hundred eighty seven</b>	
	Previous Marks	450	180	276	Two hundred seventy six	
	<b>Grand Total</b>	<b>900</b>	<b>360</b>	<b>563</b>	<b>Five hundred sixty three</b>	

Received Rs 5/-

Indicates exemptions earned in previous attempts

Graced under Ordinance .....

Gulbarga,

Date 2.8.1983

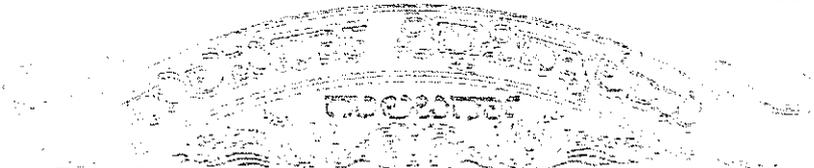
Prepared by.....

Checked by.....

  
**CONTROLLER OF EXAMINATIONS**



GULBARGA  
UNIVERSITY



ಇದೇನು ಅಧಿಕಾರದ ಮೇರೆಗೆ.  
ಇದು ನಾನು ಇದೇ ಮೇರೆಗೆ  
ಇದು ನಾನು ಇದೇ ಮೇರೆಗೆ

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

*Dr. ...*  
*...*  
*...*  
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*...*

...  
Vice-Chancellor



**ANNEXURE - 5**

SWAMIMALAI IRON ORE MINES OF MSPL LIMITED (ML.NO.2559)								
DETAILS OF CORE DRILL HOLES - 20.08.2014 TO 30.10.2014								
S.No.	Borehole No.	Easting	Northing	RL	Section	Drilled Depth(M).	Date of Start	Date of Completion
1	MKM-1	667609.80	1660470.58	1034.373	S1	60.0	20.08.2014	11.10.2014
2	MKM-2	667851.00	1660829.33	947.544	S1	50.0	01.09.2014	15.09.2014
3	MKM-16	667277.61	1660751.82	1036.641	S6	52.0	16.09.2014	30.09.2014
4	MKM-17	667508.04	1660696.40	1010.502	S4	42.5	02.10.2014	30.10.2014
<b>TOTAL</b>						204.5		

DETAILS OF REVERSE CIRCULATION DRILL HOLES - 09.09.2014 TO 14.09.2014								
S.No.	Borehole No.	Easting	Northing	RL	Section	Drilled Depth(M).	Date of Start	Date of Completion
1	MKMR-3	667713.40	1660781.33	967.033	S2	67	09.09.2014	09.09.2014
2	MKMR-4	667789.63	1660724.88	945.935	S1	40	09.09.2014	09.09.2014
3	MKMR-5	667722.04	1660642.50	986.211	S1	30	10.09.2014	10.09.2014
4	MKMR-6	667657.41	1660700.52	986.049	S2	90	10.09.2014	11.09.2014
5	MKMR-7	667656.40	1660567.17	1003.647	S1	94	11.09.2014	12.09.2014
6	MKMR-8	667587.64	1660624.36	986.986	S2	45	12.09.2014	12.09.2014
7	MKMR-9	667360.84	1660676.31	1040.54	S5	60	12.09.2014	12.09.2014
8	MKMR-10	667433.86	1660750.45	1022.153	S5	80	13.09.2014	13.09.2014
9	MKMR-11	667446.00	1660620.65	1031.16	S4	60	13.09.2014	13.09.2014
10	MKMR-12	667523.43	1660543.81	1036.718	S3	80	13.09.2014	13.09.2014
11	MKMR-13	667155.84	1660732.96	1006.409	S7	50	14.09.2014	14.09.2014
12	MKMR-14	667199.87	1660655.67	998.996	S6	50	14.09.2014	14.09.2014
13	MKMR-15	667621.53	1660761.82	982.696	S3	50	14.09.2014	14.09.2014
<b>TOTAL</b>						796		
<b>GRAND TOTAL</b>						1000.5		

ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)  
 M/s PARTHIVYAS MANGANESE AND IRON ORES LTD. LEASE AREA (HL No. 2559)  
 DIST: BELLARY, KARNATAKA

BOREHOLE NO: MP11-1

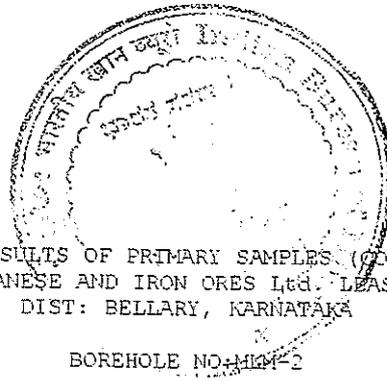
LATITUDE : 1331907.407 DATE OF COMMENCEMENT : 20.08.2014  
 LONGITUDE : 1846049.555 DATE OF CLOSURE : 11.10.2014  
 REDUCED LEVEL (M): 1034.373 DEPTH DRILLED (M) : 60.00

DEPTH (M)	THICKNESS (M)	SAMPLE NO.	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>
FROM	TO				
0.00	1.00	MP11-1/1	55.56	8.74	9.18
1.00	1.50	MP11-1/2	51.06	8.31	12.23
1.50	3.00	MP11-1/3	50.09	8.42	11.72
3.00	4.50	MP11-1/4	51.07	8.94	3.57
4.50	5.00	MP11-1/5	51.63	7.89	2.04
5.00	5.50	MP11-1/6	51.35	8.44	3.57
5.50	7.00	MP11-1/7	50.65	8.58	5.01
7.00	8.50	MP11-1/8	50.18	7.09	5.01
8.50	10.00	MP11-1/9	59.29	8.16	5.13
10.00	11.50	MP11-1/10	50.45	9.35	3.56
11.50	12.50	MP11-1/11	59.77	9.62	3.56
12.50	13.50	MP11-1/12	50.15	8.12	4.58
13.50	14.00	MP11-1/13	59.54	9.36	4.10
14.00	15.50	MP11-1/14	59.95	8.91	4.60
15.50	17.00	MP11-1/15	50.03	8.62	4.09
17.00	18.50	MP11-1/16	59.70	9.34	4.09
18.50	20.00	MP11-1/17	59.77	9.94	3.57
20.00	21.50	MP11-1/18	59.69	8.25	5.11
21.50	23.00	MP11-1/19	59.96	8.48	4.59
23.00	24.50	MP11-1/20	50.98	8.74	2.55
24.50	25.50	MP11-1/21	59.33	9.66	2.04
25.50	26.50	MP11-1/22	50.59	9.90	1.53
26.50	27.00	MP11-1/23	47.51	8.14	13.34
27.00	28.00	MP11-1/24	47.88	8.00	13.73
28.00	28.50	MP11-1/25	47.20	8.14	14.28
28.50	29.50	MP11-1/26	52.35	1.92	2.06
29.50	31.00	MP11-1/27	45.95	2.68	14.75
31.00	31.50	MP11-1/28	40.96	2.22	18.34
31.50	32.00	MP11-1/29	40.47	3.54	16.31
32.00	33.50	MP11-1/30	39.86	1.78	17.33



BOREHOLE NO:MKM-1

DEPTH (M)		THICKNESS (M)	SAMPLE NO.	Fe	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>
FROM	TO					
33.50	35.00	1.50	MKM-1/31	38.85	2.08	16.72
35.00	36.50	1.50	MKM-1/32	46.62	2.84	13.26
36.50	38.00	1.50	MKM-1/33	37.95	2.86	17.84
39.00	38.50	0.50	MKM-1/34	37.39	3.04	18.35
38.50	40.00	1.50	MKM-1/35	46.62	4.26	15.81
40.00	41.50	1.50	MKM-1/36	47.35	4.88	16.63
41.50	43.00	1.50	MKM-1/37	47.80	1.88	14.76
43.00	44.50	1.50	MKM-1/38	33.92	3.88	19.89
44.50	45.50	1.00	MKM-1/39	30.95	4.05	21.39
45.50	46.00	0.50	MKM-1/40	28.04	1.86	27.01
46.00	47.50	1.50	MKM-1/41	33.22	1.44	19.89
47.50	49.00	1.50	MKM-1/42	35.55	2.28	18.84
49.00	50.50	1.50	MKM-1/43	24.14	28.60	24.97
50.50	51.00	0.50	MKM-1/44	42.30	29.36	7.14
51.00	51.50	0.50	MKM-1/45	44.35	15.72	13.76
51.50	52.50	1.00	MKM-1/46	43.26	16.43	14.78
52.50	53.00	0.50	MKM-1/47	44.35	15.62	15.76
53.00	54.00	1.00	MKM-1/48	44.04	14.29	13.24
54.00	55.50	1.50	MKM-1/49	41.60	17.12	15.30
55.50	56.50	1.00	MKM-1/50	36.85	20.04	17.85
56.50	58.00	1.50	MKM-1/51	34.61	21.71	24.47
58.00	60.00	2.00	MKM-1/52	38.78	20.11	12.23



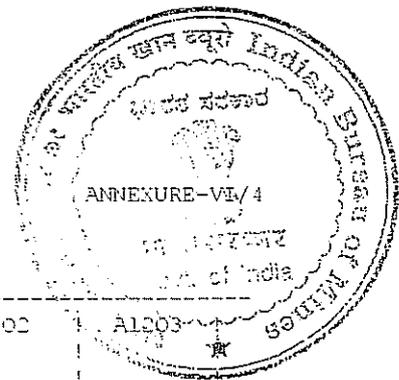
ANNEXURE-VI/3

ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)  
 M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559)  
 DIST: BELLARY, KARNATAKA

BOREHOLE NO. MKM-2

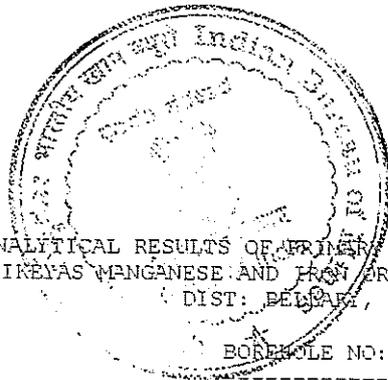
LATITUDE : 1333264.886 DATE OF COMMENCEMENT : 01.09.2014  
 LONGITUDE : 2845290.645 DATE OF CLOSURE : 15.09.2014  
 REDUCED LEVEL (M): 947.544 DEPTH DRILLED (M) : 50.00

DEPTH (M)	THICKNESS (M)	SAMPLE NO.	Fe	SiO2	Al2O3
FROM	TO				
0.00	1.00	MKM-2/1	54.60	5.02	9.13
1.00	2.00	MKM-2/2	53.20	8.47	10.32
2.00	3.50	MKM-2/3	50.12	10.07	10.32
3.50	4.50	MKM-2/4	54.18	6.44	6.95
4.50	5.00	MKM-2/5	48.44	11.91	11.51
5.00	6.00	MKM-2/6	45.36	5.79	14.68
6.00	6.50	MKM-2/7	48.02	5.98	8.93
6.50	7.50	MKM-2/8	49.98	5.20	9.52
7.50	8.00	MKM-2/9	47.60	5.50	13.30
8.00	9.00	MKM-2/10	46.48	7.88	14.29
9.00	10.50	MKM-2/11	30.80	20.86	21.43
10.50	12.00	MKM-2/12	24.36	27.54	26.19
12.00	13.50	MKM-2/13	18.90	26.64	30.38
13.50	15.00	MKM-2/14	18.34	24.91	30.23
15.00	16.00	MKM-2/15	23.38	25.62	25.58
16.00	17.50	MKM-2/16	32.62	21.25	19.22
17.50	19.00	MKM-2/17	30.38	22.63	20.62
19.00	20.50	MKM-2/18	29.40	23.64	21.08
20.50	21.00	MKM-2/19	23.52	28.81	23.09
21.00	22.00	MKM-2/20	29.82	22.61	20.77
22.00	23.50	MKM-2/21	18.34	33.41	27.13
23.50	24.00	MKM-2/22	13.52	36.02	31.00
24.00	25.50	MKM-2/23	21.28	30.29	25.89
25.50	27.00	MKM-2/24	24.22	27.50	23.87
27.00	28.50	MKM-2/25	23.52	28.61	25.12
28.50	30.00	MKM-2/26	33.88	22.63	19.78
30.00	31.00	MKM-2/27	29.68	24.38	21.35
31.00	32.50	MKM-2/28	38.36	18.60	17.27
32.50	34.00	MKM-2/29	38.50	19.06	17.42
34.00	35.00	MKM-2/30	29.26	24.71	22.45



BOREHOLE NO:MKM-2

DEPTH (M)		THICKNESS	SAMPLE NO.	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>
FROM	TO	(M)				
35.00	36.00	1.00	MKM-2/31	24.08	27.69	24.49
36.00	37.50	1.50	MKM-2/32	62.02	3.42	4.55
37.50	39.00	1.50	MKM-2/33	65.94	1.18	1.88
39.00	40.50	1.50	MKM-2/34	61.74	3.97	3.61
40.50	42.00	1.50	MKM-2/35	32.48	21.57	18.68
42.00	43.50	1.50	MKM-2/36	21.70	30.00	25.75
43.50	45.00	1.50	MKM-2/37	23.52	27.54	23.03
45.00	46.50	1.50	MKM-2/38	23.10	28.82	22.78
46.50	48.00	1.50	MKM-2/39	25.06	26.87	23.28
48.00	49.00	1.00	MKM-2/40	22.82	29.10	23.28
49.00	50.00	1.00	MKM-2/41	21.42	30.14	25.24



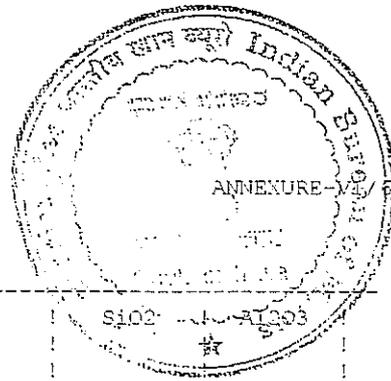
ANNEXURE-VI/5

ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)  
 M/s KARTHIREYAS MANGANESE AND IRON PILES Ltd. LEASE AREA (ML No.2559)  
 DIST: BELGAUM, KARNATAKA

BOREHOLE NO:MKM-16

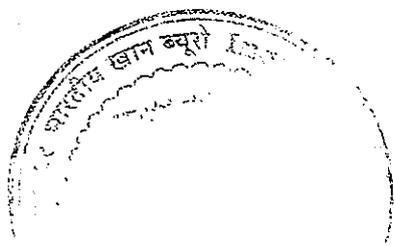
LATITUDE : 1333190.392 DATE OF COMMENCEMENT : 16.09.2014  
 LONGITUDE : 2844718.855 DATE OF CLOSURE : 30.09.2014  
 REDUCED LEVEL (M):1036.641 DEPTH DRILLED (M) : 52.00

DEPTH (M)	THICKNESS (M)	SAMPLE NO.	Fe	SiO2	Al2O3	
FROM	TO					
0.00	1.50	1.50	MKM-16/1	33.74	12.36	21.19
1.50	3.00	1.50	MKM-16/2	26.04	14.31	29.89
3.00	4.50	1.50	MKM-16/3	30.80	17.72	23.03
4.50	5.50	1.00	MKM-16/4	39.06	10.15	19.72
5.50	7.00	1.50	MKM-16/5	46.34	5.31	14.21
7.00	8.00	1.00	MKM-16/6	42.23	5.45	15.44
8.00	9.00	1.00	MKM-16/7	36.68	3.65	24.62
9.00	9.50	0.50	MKM-16/8	40.04	6.63	19.85
9.50	10.00	0.50	MKM-16/9	30.80	3.47	34.54
10.00	10.50	0.50	MKM-16/10	42.42	5.36	13.30
10.50	11.00	0.50	MKM-16/11	29.54	15.83	26.00
11.00	11.50	0.50	MKM-16/12	41.16	4.47	23.03
11.50	12.00	0.50	MKM-16/13	44.38	5.57	17.67
12.00	12.70	0.70	MKM-16/14	43.96	5.72	17.87
12.70	13.00	0.30	MKM-16/15	47.88	4.14	15.68
13.00	13.50	0.50	MKM-16/16	48.86	4.45	13.70
13.50	14.50	1.00	MKM-16/17	44.24	8.61	16.28
14.50	15.50	1.00	MKM-16/18	49.42	4.07	16.67
15.50	16.50	1.00	MKM-16/19	46.48	7.03	15.68
16.50	18.00	1.50	MKM-16/20	42.56	11.42	15.07
18.00	19.50	1.50	MKM-16/21	38.64	5.30	21.20
19.50	20.00	0.50	MKM-16/22	36.26	9.38	22.77
20.00	20.50	0.50	MKM-16/23	34.72	8.80	22.14
20.50	21.50	1.00	MKM-16/24	28.56	11.26	28.73
21.50	22.00	0.50	MKM-16/25	22.96	16.93	29.83
22.00	23.00	1.00	MKM-16/26	30.94	5.09	30.30
23.00	24.50	1.50	MKM-16/27	35.70	4.85	24.34
24.50	26.00	1.50	MKM-16/28	34.86	9.80	23.39
26.00	27.50	1.50	MKM-16/29	14.56	31.45	30.30
27.50	29.00	1.50	MKM-16/30	14.28	29.13	30.62



BOREHOLE NO:MM-16

DEPTH (M)		THICKNESS	SAMPLE NO.	Fe	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>
FROM	TO	(M)				
29.00	30.00	1.00	MM-16/31	11.48	33.47	31.71
30.00	31.50	1.50	MM-16/32	36.36	19.19	19.45
31.50	33.00	1.50	MM-16/33	34.72	18.72	20.44
33.00	34.50	1.50	MM-16/34	24.50	26.92	25.60
34.50	36.00	1.50	MM-16/35	13.58	35.13	31.75
36.00	37.50	1.50	MM-16/36	20.72	27.92	28.58
37.50	38.50	1.00	MM-16/37	14.96	34.65	30.16
38.50	39.50	1.00	MM-16/38	11.06	36.97	32.35
39.50	40.50	1.00	MM-16/39	17.92	32.88	29.77
40.50	42.00	1.50	MM-16/40	12.04	37.42	32.35
42.00	43.00	1.00	MM-16/41	7.84	39.96	34.73
43.00	44.00	1.00	MM-16/42	14.84	34.90	31.75
44.00	45.50	1.50	MM-16/43	46.76	12.78	12.50
45.50	47.50	2.00	MM-16/44	35.70	19.57	19.72
47.50	49.00	1.50	MM-16/45	13.58	32.09	28.91
49.00	50.00	1.00	MM-16/46	20.86	29.34	26.70
50.00	51.00	1.00	MM-16/47	20.16	39.71	27.00
51.00	52.00	1.00	MM-16/48	42.00	13.61	10.66



ANALYTICAL RESULTS OF PRIMARY SAMPLES (CORE DRILLING)  
M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559)  
DIST: BELLARY, KARNATAKA

BOREHOLE NO:MM-17

LATITUDE : 1333133.765 DATE OF COMMENCEMENT : 02.10.2014  
LONGITUDE : 2844948.984 DATE OF CLOSURE : 30.10.2014  
REDUCED LEVEL (M) : 1010.502 DEPTH DRILLED (M) : 42.50

DEPTH (M)	THICKNESS (M)	SAMPLE NO.	Fe	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>
FROM	TO				
0.00	1.00	MM-17/1	59.36	2.09	5.02
1.00	2.00	MM-17/2	60.76	1.87	5.51
2.00	3.75	MM-17/3	63.42	2.02	3.52
3.75	4.75	MM-17/4	63.98	2.29	3.73
4.75	6.25	MM-17/5	52.92	8.83	9.03
6.25	7.75	MM-17/6	63.28	3.64	4.28
7.75	8.50	MM-17/7	63.98	2.73	4.28
8.50	9.00	MM-17/8	62.72	2.11	5.51
9.00	9.50	MM-17/9	50.96	7.70	11.32
9.50	10.00	MM-17/10	63.28	1.87	6.27
10.00	10.50	MM-17/11	24.78	7.30	34.05
10.50	11.00	MM-17/12	40.46	2.71	22.19
11.00	11.50	MM-17/13	65.94	0.78	3.77
11.50	12.00	MM-17/14	67.20	0.45	2.76
12.00	13.00	MM-17/15	66.08	0.76	3.37
13.00	13.50	MM-17/16	65.24	1.75	3.37
13.50	15.00	MM-17/17	68.04	0.46	1.39
15.00	15.50	MM-17/18	67.62	0.54	1.99
15.50	16.00	MM-17/19	66.08	0.62	3.18
16.00	16.50	MM-17/20	67.20	0.97	2.38
16.50	17.00	MM-17/21	66.36	0.80	2.58
17.00	17.50	MM-17/22	66.36	1.44	2.76
17.50	18.50	MM-17/23	66.36	0.80	3.37
18.50	20.50	MM-17/24	68.74	0.44	1.09
20.50	21.00	MM-17/25	67.20	0.46	2.52
21.00	21.50	MM-17/26	65.80	0.65	3.69
21.50	22.50	MM-17/27	65.80	0.77	2.52
22.50	23.00	MM-17/28	67.20	0.70	1.94
23.00	23.50	MM-17/29	66.08	1.16	2.72
23.50	24.00	MM-17/30	67.90	0.52	2.13



ANNEXURE-VI/8

BOREHOLE NO:MKM-17

DEPTH (M)		THICKNESS (M)	SAMPLE NO.	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>
FROM	TO					
24.00	25.00	1.00	MKM-17/31	69.18	0.35	1.75
25.00	25.50	0.50	MKM-17/32	68.18	0.42	1.36
25.50	26.00	0.50	MKM-17/33	68.32	0.42	1.55
26.00	27.00	1.00	MKM-17/34	67.06	0.46	3.10
27.00	28.50	1.50	MKM-17/35	67.90	0.78	1.75
28.50	29.00	0.50	MKM-17/36	68.46	0.60	1.36
29.00	29.50	0.50	MKM-17/37	69.88	0.46	0.64
29.50	30.00	0.50	MKM-17/38	65.24	0.81	0.96
30.00	30.50	0.50	MKM-17/39	66.50	0.67	0.64
30.50	31.50	1.00	MKM-17/40	64.82	0.58	0.64
31.50	33.00	1.50	MKM-17/41	64.40	0.97	0.96
33.00	34.50	1.50	MKM-17/42	67.20	0.36	0.64
34.50	36.00	1.50	MKM-17/43	67.76	0.47	0.64
36.00	37.50	1.50	MKM-17/44	68.32	0.35	0.64
37.50	39.00	1.50	MKM-17/45	66.64	0.52	1.28
39.00	40.50	1.50	MKM-17/46	68.04	0.32	0.96
40.50	41.50	1.00	MKM-17/47	66.64	0.36	0.64
41.50	42.50	1.00	MKM-17/48	67.76	0.31	0.32

DETAILED LITHOLOGICAL AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MCL III  
M/S KARTHIKEYAS MANGANESE AND IRON ORES LTD. LEASE AREA (NL No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MRMP-3

LATITUDE : 133217.805  
LONGITUDE : 2845194.793  
REDUCED LEVEL (M) : 937.033

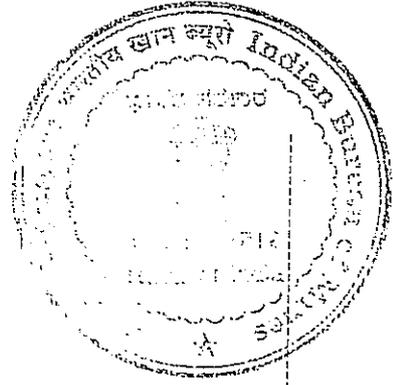
DATE OF COMMENCEMENT : 09.09.2014  
DATE OF CLOSURE : 09.09.2014  
DEPTH DRILLED (M) : 67.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
FROM	TO						
0.00	1.00	FERRUGINOUS SHALE	REDDISH BROWN	29.01	11.83	29.05	
1.00	2.00	FERRUGINOUS SHALE	REDDISH BROWN	15.34	34.25	30.57	
2.00	3.00	FERRUGINOUS SHALE	REDDISH BROWN	25.13	14.36	30.85	
3.00	4.00	FERRUGINOUS SHALE	REDDISH BROWN	27.13	13.32	28.26	
4.00	5.00	FERRUGINOUS SHALE	REDDISH BROWN	25.71	13.03	30.57	
5.00	6.00	SILICIOUS IRON ORE	REDDISH BROWN	35.67	13.03	21.89	
6.00	7.00	SILICIOUS IRON ORE	REDDISH BROWN	35.46	9.96	22.95	
7.00	8.00	SILICIOUS IRON ORE	REDDISH BROWN	32.41	22.32	21.95	
8.00	9.00	FERRUGINOUS SHALE	REDDISH BROWN	27.06	23.63	23.95	
9.00	10.00	FERRUGINOUS SHALE	REDDISH BROWN	18.15	26.74	31.42	
10.00	11.00	FERRUGINOUS SHALE	REDDISH BROWN	17.86	27.03	31.86	
11.00	12.00	FERRUGINOUS SHALE	REDDISH BROWN	24.76	22.39	24.89	
12.00	13.00	FERRUGINOUS SHALE	REDDISH BROWN	28.50	22.09	25.51	
13.00	14.00	FERRUGINOUS SHALE	REDDISH BROWN	20.37	28.61	28.55	
14.00	15.00	FERRUGINOUS SHALE	REDDISH BROWN	24.38	24.57	27.99	



BOREHOLE NO: MHTP-3

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS			Fe	SiO2	AL2O3	REMARKS
			FROM	TO					
15.00	1.00	FERRUGINOUS SHALE			22.20	25.23	29.08		
16.00	1.00	FERRUGINOUS SHALE			35.96	15.93	20.87		
17.00	1.00	FERRUGINOUS SHALE			29.56	21.28	24.96		
18.00	1.00	FERRUGINOUS SHALE			19.11	30.80	29.05		
19.00	1.00	FERRUGINOUS SHALE			22.73	27.99	26.49		
20.00	1.00	FERRUGINOUS SHALE			26.38	21.86	24.99		
21.00	1.00	FERRUGINOUS SHALE			14.24	31.76	31.62		
22.00	1.00	FERRUGINOUS SHALE			13.40	34.86	31.62		
23.00	1.00	FERRUGINOUS SHALE			15.63	34.65	31.10		
24.00	1.00	FERRUGINOUS SHALE			15.06	34.58	31.60		
25.00	1.00	FERRUGINOUS SHALE			15.91	33.86	31.11		
26.00	1.00	FERRUGINOUS SHALE			20.78	15.89	38.21		
27.00	1.00	FERRUGINOUS SHALE			16.89	30.82	30.09		
28.00	1.00	FERRUGINOUS SHALE			16.47	29.78	29.58		
29.00	1.00	FERRUGINOUS SHALE			17.99	28.82	28.54		
30.00	1.00	FERRUGINOUS SHALE			22.30	27.34	25.97	LIMONITIC	
31.00	1.00	FERRUGINOUS SHALE			15.96	27.00	24.99		
32.00	1.00	FERRUGINOUS SHALE			21.05	28.71	26.49		
33.00	1.00	SILICIOUS IRON ORE			38.09	16.91	16.31	LIMONITIC	





BOREHOLE NO:MKMP-3

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
53.00 54.00	1.00	HEMATITIC ORE	GREY BROWN	65.10	1.66	3.05	
54.00 55.00	1.00	HEMATITIC ORE	GREY BROWN	67.09	1.26	2.04	
55.00 56.00	1.00	HEMATITIC ORE	GREY BROWN	65.19	2.72	1.53	
56.00 57.00	1.00	HEMATITIC ORE	DARK BROWN	64.33	4.44	2.04	LOW GRADE
57.00 58.00	1.00	HEMATITIC ORE	DARK BROWN	57.92	15.92	1.02	LOW GRADE
58.00 59.00	1.00	HEMATITIC ORE	DARK BROWN	50.62	19.16	1.02	LOW GRADE
59.00 60.00	1.00	HEMATITIC ORE	DARK BROWN	50.36	27.02	0.68	
60.00 61.00	1.00	HEMATITIC ORE	DARK BROWN	41.03	39.26	1.78	
61.00 62.00	1.00	SILICIOUS IRON ORE	GREY BROWN	32.93	49.65	2.95	
62.00 63.00	1.00	SILICIOUS IRON ORE	GREY BROWN	33.50	49.04	2.04	
63.00 64.00	1.00	SILICIOUS IRON ORE	GREY BROWN	36.01	47.26	1.02	
64.00 65.00	1.00	HEMATITIC ORE	GREY BROWN	43.83	36.04	0.88	
65.00 66.00	1.00	BHQ	GREY BROWN	19.55	20.24	28.05	
66.00 67.00	1.00	BHQ	GREY BROWN	32.89	21.46	20.36	



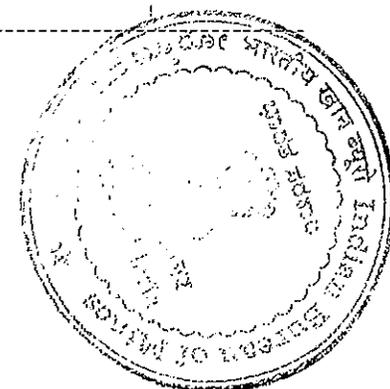
DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL III  
M/s KARTHINEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No. 2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MRMR-4

LATITUDE : 1333160.761  
LONGITUDE : 2845230.723  
REDUCED LEVEL (M): 945.935

DATE OF COMMENCEMENT : 09.09.2014  
DATE OF CLOSURE : 09.09.2014  
DEPTH DRILLED (M) : 40.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO						
0.00	1.00	HEMATITIC ORE	REDDISH BROWN	56.70	12.31	4.00	
1.00	2.00	HEMATITIC ORE	REDDISH BROWN	51.80	14.71	6.49	
2.00	3.00	HEMATITIC ORE	REDDISH BROWN	52.36	14.14	6.82	
3.00	4.00	HEMATITIC ORE	REDDISH BROWN	50.82	14.81	7.16	
4.00	5.00	HEMATITIC ORE	REDDISH BROWN	48.02	19.21	7.49	
5.00	6.00	HEMATITIC ORE	REDDISH BROWN	50.68	20.66	4.16	
6.00	7.00	HEMATITIC ORE	REDDISH BROWN	52.36	17.59	4.82	
7.00	8.00	HEMATITIC ORE	REDDISH BROWN	51.24	19.43	4.49	
8.00	9.00	HEMATITIC ORE	REDDISH BROWN	51.52	15.16	6.32	
9.00	10.00	HEMATITIC ORE	REDDISH BROWN	51.66	16.52	5.00	
10.00	11.00	HEMATITIC ORE	REDDISH BROWN	51.24	14.63	7.30	
11.00	12.00	HEMATITIC ORE	REDDISH BROWN	51.94	12.10	8.24	
12.00	13.00	HEMATITIC ORE	REDDISH BROWN	51.66	18.66	5.29	
13.00	14.00	HEMATITIC ORE	REDDISH BROWN	50.40	15.89	3.89	
14.00	15.00	HEMATITIC ORE	REDDISH BROWN	48.02	19.63	7.15	



BOREHOLE NO: M3MP-4

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
15.00 16.00	1.00	HEMATITIC ORE	REDDISH BROWN	40.32	16.12	14.62	
16.00 17.00	1.00	SHALY ORE	REDDISH BROWN	37.80	12.41	20.99	
17.00 18.00	1.00	FERRUGINOUS SHALE	DARK BROWN	29.96	18.61	23.48	
18.00 19.00	1.00	FERRUGINOUS SHALE	DARK BROWN	28.28	24.83	20.99	
19.00 20.00	1.00	FERRUGINOUS SHALE	DARK BROWN	34.16	23.13	17.88	
20.00 21.00	1.00	SHALE	LIGHT BROWN	18.06	33.79	27.52	
21.00 22.00	1.00	SHALE	LIGHT BROWN	15.12	34.89	29.70	
22.00 23.00	1.00	SHALE	LIGHT BROWN	15.82	36.08	30.38	
23.00 24.00	1.00	SHALE	LIGHT BROWN	16.80	34.67	28.54	
24.00 25.00	1.00	SHALE	LIGHT BROWN	16.38	34.60	29.64	
25.00 26.00	1.00	SHALE	LIGHT BROWN	27.44	26.64	22.78	
26.00 27.00	1.00	SHALE	LIGHT BROWN	28.00	27.58	23.15	
27.00 28.00	1.00	SHALE	LIGHT BROWN	25.48	28.39	24.26	
28.00 29.00	1.00	SHALE	LIGHT BROWN	32.20	24.72	20.34	
29.00 30.00	1.00	SHALE	LIGHT BROWN	25.48	28.56	24.13	
30.00 31.00	1.00	SHALE	GREYISH WHITE	9.36	40.09	33.69	
31.00 32.00	1.00	SHALE	GREYISH WHITE	17.92	33.76	28.18	
32.00 33.00	1.00	SHALE	GREYISH WHITE	18.62	33.51	28.18	
33.00 34.00	1.00	SHALE	GREYISH WHITE	15.82	35.54	29.77	

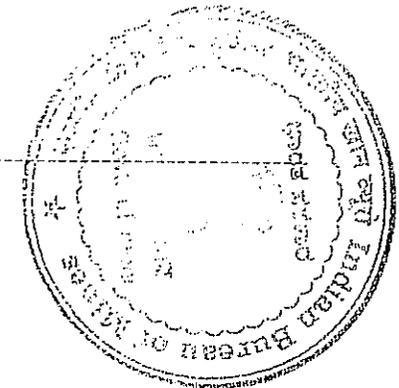


EXHIBIT 10-11111-1

DEPTH (ft)	THICKNESS (ft)	LITHOLOGY	COLOR DETAILS	Sp	Sp. G.	ALD. G.	PERCENT
21,00 - 22,00	1,00	SAND	SPRINK WHITE	11.14	21.78	20.00	
22,00 - 23,00	1,00	SAND	SPRINK WHITE	11.10	20.90	19.82	
23,00 - 24,00	1,00	SAND	SPRINK WHITE	11.24	20.92	21.77	
24,00 - 25,00	1,00	SAND	SPRINK WHITE	11.50	20.81	20.80	
25,00 - 26,00	1,00	SAND	SPRINK WHITE	11.50	20.77	20.84	
26,00 - 27,00	1,00	SAND	SPRINK WHITE	11.01	20.15	19.10	

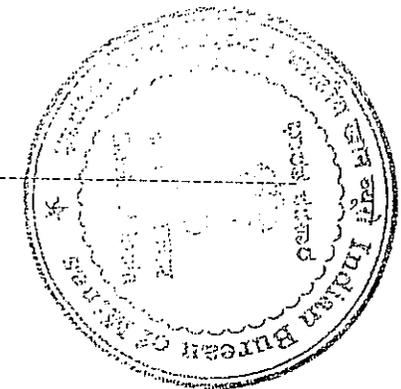
DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL III  
M/s. KARTHIKEYAS NANGAJESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-5

LATITUDE : 1333078.739  
LONGITUDE : 2845162.697  
REDUCED LEVEL (M) : 986.211

DATE OF COMMENCEMENT : 10.09.2014  
DATE OF CLOSURE : 10.09.2014  
DEPTH DRILLED (M) : 30.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO						
0.00	1.00	HEMATITIC ORE	DARK BROWN	41.30	28.19	5.39	
1.00	2.00	HEMATITIC ORE	DARK BROWN	41.72	28.50	5.64	
2.00	3.00	HEMATITIC ORE	DARK BROWN	57.98	5.17	5.88	
3.00	4.00	HEMATITIC ORE	DARK BROWN	47.60	24.50	3.55	
4.00	5.00	HEMATITIC ORE	DARK BROWN	56.84	8.62	5.02	
5.00	6.00	HEMATITIC ORE	DARK BROWN	46.62	24.82	3.92	
6.00	7.00	HEMATITIC ORE	DARK BROWN	49.56	19.42	4.53	
7.00	8.00	HEMATITIC ORE	DARK BROWN	54.74	5.59	5.02	
8.00	9.00	HEMATITIC ORE	DARK BROWN	58.52	2.91	4.53	
9.00	10.00	HEMATITIC ORE	DARK BROWN	52.08	6.49	7.35	
10.00	11.00	HEMATITIC ORE	REDDISH BROWN	54.74	6.67	7.32	
11.00	12.00	HEMATITIC ORE	REDDISH BROWN	53.62	6.06	8.66	
12.00	13.00	HEMATITIC ORE	REDDISH BROWN	53.76	6.52	7.82	
13.00	14.00	HEMATITIC ORE	REDDISH BROWN	55.72	4.91	7.99	
14.00	15.00	HEMATITIC ORE	REDDISH BROWN	57.26	4.52	7.32	



BOREHOLE NO:MKMR-5

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
15.00 16.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.54	5.06	6.82	
16.00 17.00	1.00	HEMATITIC ORE	REDDISH BROWN	54.04	6.56	8.15	
17.00 18.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.54	5.21	6.49	
18.00 19.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	55.44	4.13	7.65	LIMONITIC
19.00 20.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	57.54	5.10	9.49	
20.00 21.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	58.24	3.19	4.99	
21.00 22.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	53.06	2.25	5.49	
22.00 23.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	54.04	2.55	5.83	
23.00 24.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	56.84	1.00	4.83	
24.00 25.00	1.00	HEMATITIC ORE	REDDISH BROWN	58.52	1.46	8.82	
25.00 26.00	1.00	HEMATITIC ORE	REDDISH BROWN	56.28	1.75	5.66	
26.00 27.00	1.00	HEMATITIC ORE	REDDISH BROWN	54.88	1.53	6.16	
27.00 28.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	60.48	1.19	4.50	
28.00 29.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	52.92	2.86	12.13	
29.00 30.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	50.16	2.58	11.49	



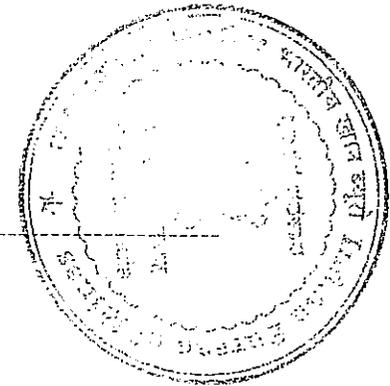
DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL III  
M/s KARTHINEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (HL No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE ID:HKMR-6

LATITUDE : 1333137.099  
LONGITUDE : 2845098.374  
REDUCED LEVEL (M): 986.049

DATE OF COMMENCEMENT : 10.09.2014  
DATE OF CLOSURE : 11.09.2014  
DEPTH DRILLED (M) : 90.00

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
0.00 1.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.24	2.08	2.50	
1.00 2.00	1.00	HEMATITIC ORE	REDDISH BROWN	62.44	3.02	3.83	
2.00 3.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.56	1.00	2.50	
3.00 4.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.00	0.95	3.16	
4.00 5.00	1.00	HEMATITIC ORE	REDDISH BROWN	56.28	3.11	4.49	
5.00 6.00	1.00	HEMATITIC ORE	REDDISH BROWN	53.76	3.49	4.96	
6.00 7.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.40	1.94	3.31	
7.00 8.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	60.48	0.85	3.07	
8.00 9.00	1.00	LIMONITIC ORE	YELLOWISH BROWN	63.14	0.76	1.89	
9.00 10.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.12	1.28	4.48	
10.00 11.00	1.00	HEMATITIC ORE	REDDISH BROWN	59.64	1.92	3.78	
11.00 12.00	1.00	HEMATITIC ORE	REDDISH BROWN	60.20	0.85	3.54	
12.00 13.00	1.00	HEMATITIC ORE	REDDISH BROWN	60.48	0.88	3.54	
13.00 14.00	1.00	HEMATITIC ORE	REDDISH BROWN	54.88	2.72	4.96	
14.00 15.00	1.00	HEMATITIC ORE	REDDISH BROWN	61.04	0.84	3.78	



15.00	16.00	1.00	HEMATITIC ORE
16.00	17.00	1.00	HEMATITIC ORE
17.00	18.00	1.00	HEMATITIC ORE
18.00	19.00	1.00	HEMATITIC ORE
19.00	20.00	1.00	HEMATITIC ORE
20.00	21.00	1.00	HEMATITIC ORE
21.00	22.00	1.00	HEMATITIC ORE
22.00	23.00	1.00	HEMATITIC ORE
23.00	24.00	1.00	HEMATITIC ORE
24.00	25.00	1.00	HEMATITIC ORE
25.00	26.00	1.00	HEMATITIC ORE
26.00	27.00	1.00	HEMATITIC ORE
27.00	28.00	1.00	HEMATITIC ORE
28.00	29.00	1.00	HEMATITIC ORE
29.00	30.00	1.00	HEMATITIC ORE
30.00	31.00	1.00	HEMATITIC ORE
31.00	32.00	1.00	HEMATITIC ORE
32.00	33.00	1.00	HEMATITIC ORE
33.00	34.00	1.00	HEMATITIC ORE

LITHOLOGY

DEPTH (M) THICKNESS (M) FROM TO

BOREHOLE NUMBER-6

COLOR DETAILS

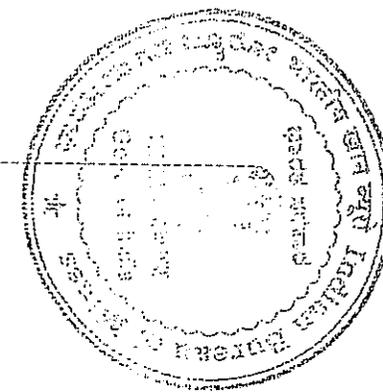
Fe S10C AT03 REMARKS

58.80	1.75	4.49	REDDISH BROWN
59.36	0.86	4.16	REDDISH BROWN
62.30	0.78	2.94	REDDISH BROWN
60.48	0.98	3.55	REDDISH BROWN
62.44	0.86	2.20	REDDISH BROWN
66.36	0.64	0.12	REDDISH BROWN
66.08	0.44	1.35	REDDISH BROWN
67.06	0.56	1.35	REDDISH BROWN
67.62	0.39	0.98	GREY BROWN
68.18	0.51	1.10	GREY BROWN
67.06	0.54	1.59	GREY BROWN
67.20	0.61	0.49	GREY BROWN
66.78	0.39	1.35	GREY BROWN
68.32	0.48	1.50	GREY BROWN
68.60	0.20	1.33	GREY BROWN
68.04	0.51	1.33	GREY BROWN
68.88	0.44	0.83	GREY BROWN
68.88	0.40	0.83	GREY BROWN
68.88	0.41	0.83	GREY BROWN



BOREHOLE NO:MKMR-6

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
34.00 35.00	1.00	HEMATITIC ORE	GREY BROWN	68.60	0.41	1.00	
35.00 36.00	1.00	BLUE DUST	BL GREY	69.02	0.38	0.83	
36.00 37.00	1.00	BLUE DUST	BL GREY	68.74	0.46	0.83	
37.00 38.00	1.00	BLUE DUST	BL GREY	68.74	0.53	1.00	
38.00 39.00	1.00	BLUE DUST	BL GREY	68.18	0.44	1.83	
39.00 40.00	1.00	BLUE DUST	BL GREY	68.60	0.52	1.16	
40.00 41.00	1.00	BLUE DUST	BL GREY	67.20	0.64	1.87	
41.00 42.00	1.00	BLUE DUST	BL GREY	68.04	0.42	1.88	
42.00 43.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.54	0.37	2.02	
43.00 44.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.66	3.00	1.40	
44.00 45.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.48	0.89	1.71	
45.00 46.00	1.00	HEMATITIC ORE	REDDISH BROWN	49.84	25.79	1.72	
46.00 47.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.90	0.57	1.70	
47.00 48.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.78	0.98	1.40	
48.00 49.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.48	0.19	1.24	
49.00 50.00	1.00	HEMATITIC ORE	GREY BROWN	66.92	0.91	2.64	
50.00 51.00	1.00	HEMATITIC ORE	GREY BROWN	63.00	0.17	2.49	
51.00 52.00	1.00	HEMATITIC ORE	GREY BROWN	63.56	0.69	3.73	
52.00 53.00	1.00	HEMATITIC ORE	GREY BROWN	66.64	4.17	0.47	



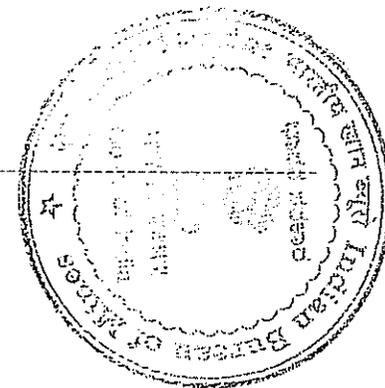
BOREHOLE NO:MKMR-6

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
53.00 54.00	1.00	HEMATITIC ORE	GREY BROWN	66.22	3.14	2.12	
54.00 55.00	1.00	HEMATITIC ORE	GREY BROWN	67.06	2.15	1.89	
55.00 56.00	1.00	HEMATITIC ORE	GREY BROWN	66.50	2.96	1.89	
56.00 57.00	1.00	HEMATITIC ORE	GREY BROWN	66.08	3.11	1.89	
57.00 58.00	1.00	HEMATITIC ORE	GREY BROWN	69.02	0.58	0.71	
58.00 59.00	1.00	HEMATITIC ORE	GREY BROWN	69.02	0.77	0.47	
59.00 60.00	1.00	HEMATITIC ORE	GREY BROWN	69.02	0.66	0.47	
60.00 61.00	1.00	HEMATITIC ORE	GREY BROWN	67.62	2.22	0.71	
61.00 62.00	1.00	HEMATITIC ORE	GREY BROWN	67.48	2.02	1.41	
62.00 63.00	1.00	HEMATITIC ORE	GREY BROWN	67.20	1.88	1.65	
63.00 64.00	1.00	HEMATITIC ORE	GREY BROWN	67.20	2.11	1.41	
64.00 65.00	1.00	HEMATITIC ORE	GREY BROWN	65.87	3.19	1.83	
65.00 66.00	1.00	HEMATITIC ORE	GREY BROWN	65.38	3.20	2.83	
66.00 67.00	1.00	HEMATITIC ORE	GREY BROWN	65.59	2.61	2.83	
67.00 68.00	1.00	HEMATITIC ORE	GREY BROWN	66.08	2.49	2.50	
68.00 69.00	1.00	HEMATITIC ORE	DARK BROWN	59.43	7.88	6.16	
69.00 70.00	1.00	HEMATITIC ORE	DARK BROWN	54.32	10.42	8.49	
70.00 71.00	1.00	HEMATITIC ORE	GREY BROWN	64.33	3.68	3.50	
71.00 72.00	1.00	HEMATITIC ORE	GREY BROWN	64.33	4.04	3.16	



## BOREHOLE NO:MKNR-5

DEPTH (M)		THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO							
72.00	73.00	1.00	HEMATITIC ORE	GREY BROWN	48.44	14.70	12.15	
73.00	74.00	1.00	HEMATITIC ORE	GREY BROWN	40.88	18.73	15.48	
74.00	75.00	1.00	HEMATITIC ORE	GREY BROWN	53.20	11.51	9.16	
75.00	76.00	1.00	HEMATITIC ORE	GREY BROWN	64.05	5.06	2.50	
76.00	77.00	1.00	HEMATITIC ORE	GREY BROWN	62.44	4.69	2.82	
77.00	78.00	1.00	HEMATITIC ORE	GREY BROWN	61.04	5.64	2.08	
78.00	79.00	1.00	HEMATITIC ORE	GREY BROWN	64.12	4.67	1.47	
79.00	80.00	1.00	HEMATITIC ORE	GREY BROWN	62.30	3.48	2.94	
80.00	81.00	1.00	HEMATITIC ORE	GREY BROWN	59.64	10.54	1.59	
81.00	82.00	1.00	HEMATITIC ORE	GREY BROWN	57.68	15.28	1.20	
82.00	83.00	1.00	HEMATITIC ORE	GREY BROWN	53.20	19.05	0.49	
83.00	84.00	1.00	HEMATITIC ORE	GREY BROWN	67.76	0.42	0.49	
84.00	85.00	1.00	HEMATITIC ORE	GREY BROWN	45.36	32.05	0.61	
85.00	86.00	1.00	BHQ	GREY BROWN	44.80	33.90	0.86	
86.00	87.00	1.00	BHQ	GREY BROWN	26.04	58.79	1.56	
87.00	88.00	1.00	BHQ	GREY BROWN	22.12	58.54	4.04	
88.00	89.00	1.00	BHQ	GREY BROWN	27.16	54.54	1.00	
89.00	90.00	1.00	BHQ	GREY BROWN	27.86	59.23	0.67	



DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL III  
M/s KARTHINEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (HL No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-7

LATITUDE : 1333003.750  
LONGITUDE : 2845096.563  
REDUCED LEVEL (M): 1003.647

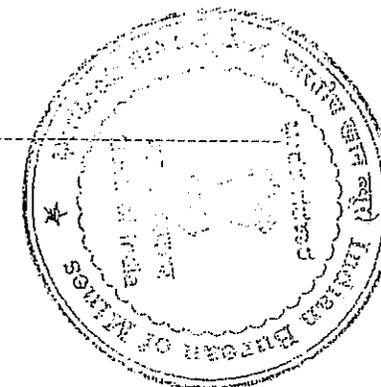
DATE OF COMMENCEMENT : 11.09.2014  
DATE OF CLOSURE : 12.09.2014  
DEPTH DRILLED (M) : 94.00

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
0.00 1.00	1.00	HEMATITIC ORE	DARK BROWN	52.92	16.86	4.03	
1.00 2.00	1.00	HEMATITIC ORE	DARK BROWN	60.62	8.85	2.75	
2.00 3.00	1.00	HEMATITIC ORE	DARK BROWN	60.90	4.98	4.22	
3.00 4.00	1.00	HEMATITIC ORE	DARK BROWN	65.94	2.61	1.47	
4.00 5.00	1.00	HEMATITIC ORE	DARK BROWN	54.46	4.83	6.05	
5.00 6.00	1.00	HEMATITIC ORE	DARK BROWN	61.32	4.67	3.67	
6.00 7.00	1.00	HEMATITIC ORE	DARK BROWN	61.32	5.64	3.42	
7.00 8.00	1.00	HEMATITIC ORE	DARK BROWN	64.40	1.34	2.49	
8.00 9.00	1.00	HEMATITIC ORE	DARK BROWN	60.76	5.22	2.64	
9.00 10.00	1.00	HEMATITIC ORE	DARK BROWN	63.84	5.66	1.71	
10.00 11.00	1.00	BLUE DUST	BL GREY	66.08	2.08	2.33	
11.00 12.00	1.00	BLUE DUST	BL GREY	65.80	2.30	3.27	
12.00 13.00	1.00	BLUE DUST	BL GREY	64.96	5.14	1.40	
13.00 14.00	1.00	BLUE DUST	BL GREY	64.40	5.43	1.71	
14.00 15.00	1.00	BLUE DUST	BL GREY	67.62	1.26	1.40	



## BOREHOLE ID:MKMR-7

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
FROM	TO						
15.00	16.00	HEMATITIC ORE	GREY BROWN	64.96	1.63	1.40	
16.00	17.00	HEMATITIC ORE	GREY BROWN	62.16	1.27	5.75	
17.00	18.00	HEMATITIC ORE	GREY BROWN	64.12	1.08	2.18	
18.00	19.00	HEMATITIC ORE	GREY BROWN	68.95	0.32	0.88	
19.00	20.00	HEMATITIC ORE	GREY BROWN	59.92	8.77	2.36	
20.00	21.00	HEMATITIC ORE	GREY BROWN	65.52	0.68	1.65	
21.00	22.00	HEMATITIC ORE	GREY BROWN	64.96	0.33	2.13	
22.00	23.00	HEMATITIC ORE	GREY BROWN	65.10	0.57	1.42	
23.00	24.00	HEMATITIC ORE	GREY BROWN	65.52	0.49	1.42	
24.00	25.00	HEMATITIC ORE	GREY BROWN	64.96	0.57	1.42	
25.00	26.00	HEMATITIC ORE	GREY BROWN	65.38	0.34	4.49	
26.00	27.00	HEMATITIC ORE	GREY BROWN	65.52	0.58	3.54	
27.00	28.00	HEMATITIC ORE	GREY BROWN	66.36	0.38	2.60	
28.00	29.00	HEMATITIC ORE	GREY BROWN	65.38	0.61	4.01	
29.00	30.00	HEMATITIC ORE	DARK BROWN	64.40	1.03	3.54	
30.00	31.00	HEMATITIC ORE	DARK BROWN	67.20	1.02	0.83	
31.00	32.00	HEMATITIC ORE	DARK BROWN	67.27	0.74	2.16	
32.00	33.00	HEMATITIC ORE	DARK BROWN	61.60	1.56	6.16	
33.00	34.00	HEMATITIC ORE	DARK BROWN	60.90	0.84	6.16	



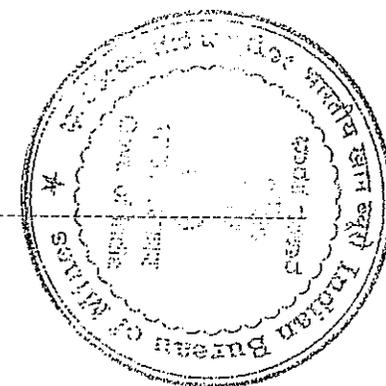
BOREHOLE NO:MMNR-7

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
34.00 35.00	1.00	HEMATITIC ORE	DARK BROWN	57.12	1.81	8.16	
35.00 36.00	1.00	HEMATITIC ORE	DARK BROWN	58.78	7.12	8.16	
36.00 37.00	1.00	HEMATITIC ORE	GREY BROWN	67.76	1.05	0.83	
37.00 38.00	1.00	HEMATITIC ORE	GREY BROWN	67.62	1.15	1.50	
38.00 39.00	1.00	HEMATITIC ORE	GREY BROWN	64.40	2.06	2.16	
39.00 40.00	1.00	HEMATITIC ORE	GREY BROWN	67.97	0.38	1.50	
40.00 41.00	1.00	HEMATITIC ORE	GREY BROWN	66.43	2.74	1.50	
41.00 42.00	1.00	HEMATITIC ORE	GREY BROWN	64.75	3.96	2.66	
42.00 43.00	1.00	HEMATITIC ORE	GREY BROWN	65.52	1.60	1.18	
43.00 44.00	1.00	HEMATITIC ORE	GREY BROWN	65.10	3.75	1.65	
44.00 45.00	1.00	HEMATITIC ORE	GREY BROWN	66.36	2.03	1.42	
45.00 46.00	1.00	HEMATITIC ORE	GREY BROWN	65.94	2.32	1.42	
46.00 47.00	1.00	HEMATITIC ORE	GREY BROWN	64.68	1.92	1.65	
47.00 48.00	1.00	HEMATITIC ORE	DARK BROWN	66.08	3.68	1.42	
48.00 49.00	1.00	HEMATITIC ORE	DARK BROWN	66.36	1.99	0.71	
49.00 50.00	1.00	HEMATITIC ORE	DARK BROWN	66.64	2.88	1.18	
50.00 51.00	1.00	HEMATITIC ORE	DARK BROWN	66.64	1.59	0.47	
51.00 52.00	1.00	HEMATITIC ORE	DARK BROWN	68.04	0.98	0.47	
52.00 53.00	1.00	HEMATITIC ORE	DARK BROWN	65.80	4.38	1.42	



BOREHOLE NO: NKMR-7

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO						
53.00	54.00	HEMATITIC ORE	DARK BROWN	67.20	2.65	0.71	
54.00	55.00	HEMATITIC ORE	DARK BROWN	65.52	3.47	2.61	
55.00	56.00	HEMATITIC ORE	DARK BROWN	65.10	3.47	3.00	
56.00	57.00	HEMATITIC ORE	GREY BROWN	66.22	3.88	1.18	
57.00	58.00	HEMATITIC ORE	GREY BROWN	67.20	3.25	0.24	
58.00	59.00	HEMATITIC ORE	GREY BROWN	65.52	5.30	0.71	
59.00	60.00	HEMATITIC ORE	GREY BROWN	65.70	5.01	0.51	
60.00	61.00	HEMATITIC ORE	GREY BROWN	68.60	1.00	0.71	
61.00	62.00	HEMATITIC ORE	REDDISH BROWN	59.64	12.23	0.94	
62.00	63.00	HEMATITIC ORE	REDDISH BROWN	61.40	11.77	0.24	
63.00	64.00	HEMATITIC ORE	REDDISH BROWN	63.36	6.37	2.57	
64.00	65.00	HEMATITIC ORE	REDDISH BROWN	58.80	8.51	2.36	
65.00	66.00	HEMATITIC ORE	REDDISH BROWN	54.04	12.05	0.24	
66.00	67.00	HEMATITIC ORE	REDDISH BROWN	60.34	0.77	6.84	
67.00	68.00	HEMATITIC ORE	REDDISH BROWN	59.64	9.21	3.10	
68.00	69.00	HEMATITIC ORE	REDDISH BROWN	60.20	7.11	2.95	
69.00	70.00	HEMATITIC ORE	REDDISH BROWN	57.54	13.12	2.64	
70.00	71.00	HEMATITIC ORE	REDDISH BROWN	52.64	18.47	4.66	
71.00	72.00	HEMATITIC ORE	REDDISH BROWN	50.40	24.56	2.64	



BOREHOLE NO:MKNR-7

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
72.00 73.00	1.00	HEMATITIC ORE	REDDISH BROWN	49.42	27.19	1.40	
73.00 74.00	1.00	HEMATITIC ORE	REDDISH BROWN	55.44	16.86	1.56	
74.00 75.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.54	13.38	1.24	
75.00 76.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.82	14.31	2.64	
76.00 77.00	1.00	HEMATITIC ORE	REDDISH BROWN	60.34	9.36	4.20	
77.00 78.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.40	12.14	3.42	
78.00 79.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.12	9.93	2.02	
79.00 80.00	1.00	HEMATITIC ORE	REDDISH BROWN	58.52	1.58	2.64	
80.00 81.00	1.00	HEMATITIC ORE	REDDISH BROWN	55.58	6.45	2.23	
81.00 82.00	1.00	HEMATITIC ORE	REDDISH BROWN	56.14	12.98	2.02	
82.00 83.00	1.00	HEMATITIC ORE	REDDISH BROWN	54.32	11.98	3.11	
83.00 84.00	1.00	HEMATITIC ORE	REDDISH BROWN	55.02	14.66	3.73	
84.00 85.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.12	7.15	3.58	
85.00 86.00	1.00	HEMATITIC ORE	REDDISH BROWN	56.00	9.68	4.04	
86.00 87.00	1.00	HEMATITIC ORE	REDDISH BROWN	58.80	11.15	3.11	
87.00 88.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.84	1.14	3.73	
88.00 89.00	1.00	HEMATITIC ORE	GREY BROWN	61.74	1.22	3.11	
89.00 90.00	1.00	HEMATITIC ORE	GREY BROWN	60.06	4.97	3.58	
90.00 91.00	1.00	HEMATITIC ORE	GREY BROWN	63.84	4.23	3.19	



BOREHOLE NO:MKMR-7

DEPTH (M) FROM	TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
91.00	92.00	1.00	HEMATITIC ORE	GREY BROWN	63.14	4.86	4.17	
92.00	93.00	1.00	HEMATITIC ORE	GREY BROWN	62.58	5.24	3.80	
93.00	94.00	1.00	HEMATITIC ORE	GREY BROWN	62.86	5.02	4.29	



DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL IN  
M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-8

LATITUDE : 1233061.306  
LONGITUDE : 2845028.206  
REDUCED LEVEL (M) : 986.986

DATE OF COMMENCEMENT : 12.09.2014  
DATE OF CLOSURE : 12.09.2014  
DEPTH DRILLED (M) : 45.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
FROM	TO						
0.00	1.00	BLUE DUST	BL GREY	66.64	0.71	1.42	
1.00	2.00	BLUE DUST	BL GREY	67.34	0.64	1.42	
2.00	3.00	SHALY ORE	REDDISH BROWN	30.38	23.63	20.78	
3.00	4.00	SHALY ORE	REDDISH BROWN	36.68	23.08	19.36	
4.00	5.00	SHALY ORE	REDDISH BROWN	30.24	25.53	22.70	
5.00	6.00	SHALY ORE	REDDISH BROWN	36.12	22.89	19.28	
6.00	7.00	HEMATITIC ORE	GREY BROWN	56.84	6.49	7.46	
7.00	8.00	HEMATITIC ORE	GREY BROWN	64.12	2.76	2.80	
8.00	9.00	HEMATITIC ORE	GREY BROWN	64.40	1.96	2.49	
9.00	10.00	HEMATITIC ORE	GREY BROWN	66.08	2.56	2.18	
10.00	11.00	HEMATITIC ORE	GREY BROWN	64.68	3.35	2.80	
11.00	12.00	HEMATITIC ORE	GREY BROWN	65.52	2.84	2.49	
12.00	13.00	HEMATITIC ORE	GREY BROWN	65.45	3.37	2.49	
13.00	14.00	HEMATITIC ORE	GREY BROWN	63.84	6.01	2.02	
14.00	15.00	HEMATITIC ORE	GREY BROWN	59.92	9.88	0.64	



DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL III  
M/s KARTHIVEYAS MAUSAMESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-8

LATITUDE : 1333061.306  
LONGITUDE : 2845028.206  
REDUCED LEVEL (M): 985.985

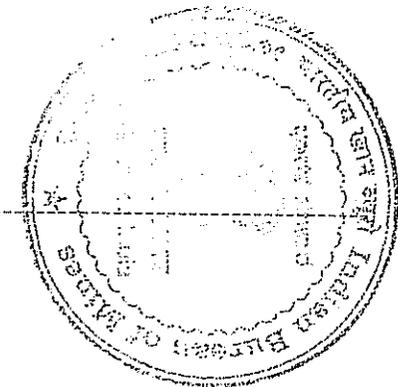
DATE OF COMMENCEMENT : 12.09.2014  
DATE OF CLOSURE : 12.09.2014  
DEPTH DRILLED (M) : 45.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS	
FROM	TO							
0.00	1.00	1.00	BLUE DUST	BL GREY	66.64	0.71	1.42	
1.00	2.00	1.00	BLUE DUST	BL GREY	67.34	0.64	1.42	
2.00	3.00	1.00	SHALY ORE	REDDISH BROWN	30.38	23.63	20.78	
3.00	4.00	1.00	SHALY ORE	REDDISH BROWN	36.68	23.08	19.36	
4.00	5.00	1.00	SHALY ORE	REDDISH BROWN	30.24	25.53	22.70	
5.00	6.00	1.00	SHALY ORE	REDDISH BROWN	36.12	22.89	19.28	
6.00	7.00	1.00	HEMATITIC ORE	GREY BROWN	56.84	6.49	7.46	
7.00	8.00	1.00	HEMATITIC ORE	GREY BROWN	64.12	2.76	2.80	
8.00	9.00	1.00	HEMATITIC ORE	GREY BROWN	64.40	1.96	2.49	
9.00	10.00	1.00	HEMATITIC ORE	GREY BROWN	66.08	2.56	2.18	
10.00	11.00	1.00	HEMATITIC ORE	GREY BROWN	64.68	3.35	2.80	
11.00	12.00	1.00	HEMATITIC ORE	GREY BROWN	65.52	2.84	2.40	
12.00	13.00	1.00	HEMATITIC ORE	GREY BROWN	65.45	3.37	2.49	
13.00	14.00	1.00	HEMATITIC ORE	GREY BROWN	63.84	6.01	2.02	
14.00	15.00	1.00	HEMATITIC ORE	GREY BROWN	59.92	9.88	0.94	



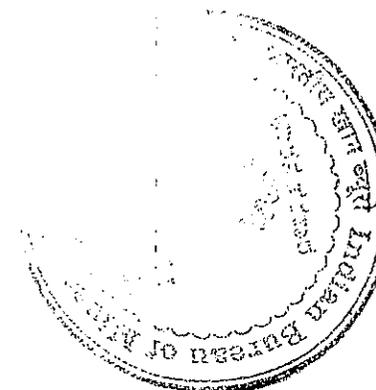
BOREHOLE NO: MNMR-8

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
15.00 16.00	1.00	HEMATITIC ORE	GREY BROWN	55.44	18.50	0.94	
16.00 17.00	1.00	HEMATITIC ORE	GREY BROWN	46.48	29.08	0.94	
17.00 18.00	1.00	HEMATITIC ORE	GREY BROWN	41.44	37.27	0.24	
18.00 19.00	1.00	BHQ	LIGHT BROWN	31.78	44.74	0.24	
19.00 20.00	1.00	BHQ	LIGHT BROWN	31.22	46.64	0.47	
20.00 21.00	1.00	BHQ	LIGHT BROWN	31.22	51.96	0.47	
21.00 22.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	42.70	35.98	0.71	
22.00 23.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	39.76	33.10	0.47	
23.00 24.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	37.10	40.88	0.24	
24.00 25.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	37.66	35.69	1.65	
25.00 26.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	42.98	34.52	0.24	
26.00 27.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	39.06	40.11	2.80	
27.00 28.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	38.22	40.73	2.49	
28.00 29.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	39.20	40.71	3.00	
29.00 30.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	38.78	41.55	2.64	
30.00 31.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	37.94	43.20	2.00	
31.00 32.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	37.52	43.51	2.34	
32.00 33.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	30.80	54.00	1.35	
33.00 34.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	42.84	30.42	1.71	



BOREHOLE NO: HKMR-8

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
34.00 35.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	39.48	40.91	2.33	
35.00 36.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	41.58	38.46	1.78	
36.00 37.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	39.62	40.00	2.65	
37.00 38.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	39.06	41.68	2.00	
38.00 39.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	37.80	41.49	1.87	
39.00 40.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	30.52	51.16	2.80	
40.00 41.00	1.00	SILICIOUS IRON ORE	DARK BROWN	39.76	19.84	14.15	
41.00 42.00	1.00	FERRUGINOUS SHALE	DARK BROWN	20.16	34.45	24.57	
42.00 43.00	1.00	FERRUGINOUS SHALE	DARK BROWN	41.72	19.79	11.66	
43.00 44.00	1.00	SHALY ORE	DARK BROWN	29.26	27.27	19.90	
44.00 45.00	1.00	FERRUGINOUS SHALE	DARK BROWN	41.30	22.68	1.87	



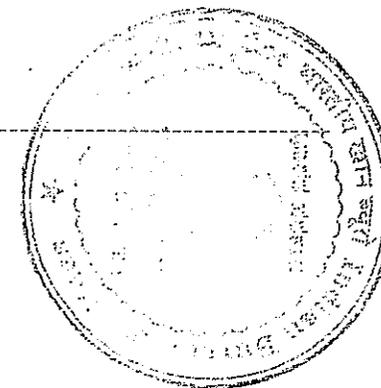
DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL III  
M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-9

LATITUDE : 1333114.448  
LONGITUDE : 2844801.578  
REDUCED LEVEL (M) : 1040.540

DATE OF COMMENCEMENT : 12.09.2014  
DATE OF CLOSURE : 12.09.2014  
DEPTH DRILLED (M) : 60.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO						
0.00	1.00	SHALY ORE	REDDISH BROWN	40.74	7.22	18.19	
1.00	2.00	SHALY ORE	REDDISH BROWN	40.60	8.11	17.57	
2.00	3.00	SHALY ORE	REDDISH BROWN	41.02	5.42	18.35	
3.00	4.00	SHALY ORE	REDDISH BROWN	36.26	10.02	20.84	
4.00	5.00	SHALY ORE	REDDISH BROWN	37.66	7.77	20.37	
5.00	6.00	SHALY ORE	REDDISH BROWN	28.56	7.16	26.68	
6.00	7.00	SHALY ORE	REDDISH BROWN	30.94	6.70	25.74	
7.00	8.00	SHALY ORE	REDDISH BROWN	47.46	5.92	12.04	
8.00	9.00	SHALY ORE	REDDISH BROWN	44.52	4.80	14.40	
9.00	10.00	SHALY ORE	REDDISH BROWN	49.56	6.05	13.22	
10.00	11.00	FERRUGINOUS SHALE	REDDISH BROWN	30.52	6.56	24.09	
11.00	12.00	HEMATITIC ORE	REDDISH BROWN	43.26	5.24	15.58	
12.00	13.00	HEMATITIC ORE	REDDISH BROWN	57.62	4.46	5.96	
13.00	14.00	HEMATITIC ORE	REDDISH BROWN	60.20	3.07	5.19	
14.00	15.00	HEMATITIC ORE	REDDISH BROWN	54.88	2.20	8.03	





HEMATITIC ORE	1.00	33.00	34.00
HEMATITIC ORE	1.00	32.00	33.00
HEMATITIC ORE	1.00	31.00	32.00
HEMATITIC ORE	1.00	30.00	31.00
HEMATITIC ORE	1.00	29.00	30.00
HEMATITIC ORE	1.00	28.00	29.00
HEMATITIC ORE	1.00	27.00	28.00
HEMATITIC ORE	1.00	26.00	27.00
HEMATITIC ORE	1.00	25.00	26.00
HEMATITIC ORE	1.00	24.00	25.00
HEMATITIC ORE	1.00	23.00	24.00
HEMATITIC ORE	1.00	22.00	23.00
HEMATITIC ORE	1.00	21.00	22.00
HEMATITIC ORE	1.00	20.00	21.00
HEMATITIC ORE	1.00	19.00	20.00
HEMATITIC ORE	1.00	18.00	19.00
HEMATITIC ORE	1.00	17.00	18.00
HEMATITIC ORE	1.00	16.00	17.00
HEMATITIC ORE	1.00	15.00	16.00

REDDISH BROWN	57.96	2.09	6.61
REDDISH BROWN	57.87	2.44	5.19
REDDISH BROWN	55.04	2.87	7.56
REDDISH BROWN	57.12	2.82	5.43
REDDISH BROWN	56.00	2.99	5.43
REDDISH BROWN	57.12	2.64	4.96
REDDISH BROWN	57.12	1.96	7.32
REDDISH BROWN	58.52	2.29	4.72
REDDISH BROWN	56.28	2.85	6.85
REDDISH BROWN	53.20	2.98	6.85
REDDISH BROWN	55.16	2.96	7.56
REDDISH BROWN	56.14	2.85	6.61
REDDISH BROWN	59.36	2.10	4.25
REDDISH BROWN	58.57	2.58	1.42
REDDISH BROWN	55.72	3.27	6.84
REDDISH BROWN	55.72	1.18	8.55
REDDISH BROWN	57.82	2.24	0.53
REDDISH BROWN	53.62	1.96	14.15
REDDISH BROWN	54.88	2.41	7.46

LITHOLOGY

DEPTH (M) THICKNESS (M) FROM TO

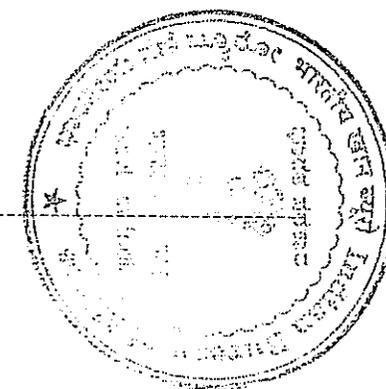
BOREHOLE NO: MKMR-9

COLOR DETAILS Fe SiO2 AL2O3 REMARKS

ALREKURB-IVB/ 25

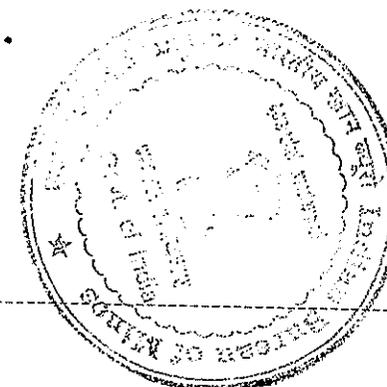
BOREHOLE NO: NKMR-9

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
34.00 35.00	1.00	HEMATITIC ORE	REDDISH BROWN	56.28	2.02	6.37	
35.00 36.00	1.00	HEMATITIC ORE	REDDISH BROWN	54.04	1.88	8.24	
36.00 37.00	1.00	HEMATITIC ORE	REDDISH BROWN	57.04	2.17	6.69	
37.00 38.00	1.00	HEMATITIC ORE	REDDISH BROWN	56.56	2.25	7.15	
38.00 39.00	1.00	HEMATITIC ORE	REDDISH BROWN	59.50	2.44	5.91	
39.00 40.00	1.00	HEMATITIC ORE	REDDISH BROWN	58.52	1.89	5.60	
40.00 41.00	1.00	HEMATITIC ORE	REDDISH BROWN	55.44	4.37	8.86	
41.00 42.00	1.00	HEMATITIC ORE	REDDISH BROWN	46.06	6.97	11.57	
42.00 43.00	1.00	HEMATITIC ORE	REDDISH BROWN	44.52	8.80	12.04	
43.00 44.00	1.00	HEMATITIC ORE	REDDISH BROWN	46.62	6.12	12.04	
44.00 45.00	1.00	HEMATITIC ORE	REDDISH BROWN	39.62	6.90	17.24	
45.00 46.00	1.00	HEMATITIC ORE	REDDISH BROWN	49.84	6.22	9.21	
46.00 47.00	1.00	HEMATITIC ORE	DARK BROWN	46.34	9.37	9.68	
47.00 48.00	1.00	HEMATITIC ORE	DARK BROWN	49.56	8.77	7.32	
48.00 49.00	1.00	SHALY ORE	DARK BROWN	41.44	14.24	13.46	
49.00 50.00	1.00	SHALY ORE	DARK BROWN	40.32	15.39	13.70	
50.00 51.00	1.00	SHALY ORE	DARK BROWN	38.50	16.42	12.75	
51.00 52.00	1.00	HEMATITIC ORE	REDDISH BROWN	50.68	8.64	6.85	
52.00 53.00	1.00	HEMATITIC ORE	REDDISH BROWN	49.84	9.55	6.85	



BOREHOLE NO:MMHR-9

DEPTH (M)			THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
FROM	TO								
53.00	54.00	1.00	SHALY ORE	REDDISH BROWN	36.96	20.01	14.88		
54.00	55.00	1.00	SHALY ORE	REDDISH BROWN	40.04	18.43	12.86		
55.00	56.00	1.00	FERRUGINOUS SHALE	DARK BROWN	32.76	25.33	16.74		
56.00	57.00	1.00	FERRUGINOUS SHALE	DARK BROWN	35.56	26.60	20.61		
57.00	58.00	1.00	FERRUGINOUS SHALE	DARK BROWN	28.14	25.43	21.85		
58.00	59.00	1.00	FERRUGINOUS SHALE	DARK BROWN	25.62	27.21	21.85		
59.00	60.00	1.00	FERRUGINOUS SHALE	DARK BROWN	27.58	28.84	22.47		



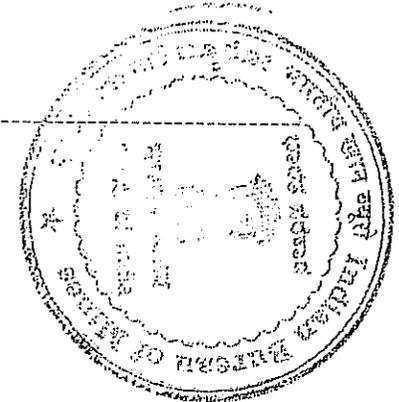
DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL IN  
M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-10

LATITUDE : 1333188.198  
LONGITUDE : 2844875.090  
REDUCED LEVEL (M) : 1022.153

DATE OF COMMENCEMENT : 13.09.2014  
DATE OF CLOSURE : 13.09.2014  
DEPTH DRILLED (M) : 80.00

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
0.00 1.00	1.00	HEMATITIC ORE	REDDISH BROWN	66.45	1.08	1.53	
1.00 2.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.21	1.26	1.02	
2.00 3.00	1.00	BLUE DUST	BL GREY	66.90	0.70	1.53	
3.00 4.00	1.00	BLUE DUST	BL GREY	68.54	1.28	0.56	
4.00 5.00	1.00	BLUE DUST	BL GREY	65.56	4.04	0.76	
5.00 6.00	1.00	BLUE DUST	BL GREY	68.31	1.54	0.60	
6.00 7.00	1.00	BLUE DUST	BL GREY	68.24	1.26	1.02	
7.00 8.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.62	5.59	1.02	
8.00 9.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.48	2.18	1.02	
9.00 10.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.78	0.22	1.27	
10.00 11.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.45	0.42	2.03	
11.00 12.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.90	0.80	2.03	
12.00 13.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.00	0.50	2.03	
13.00 14.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.20	1.04	1.53	
14.00 15.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.56	0.58	4.33	



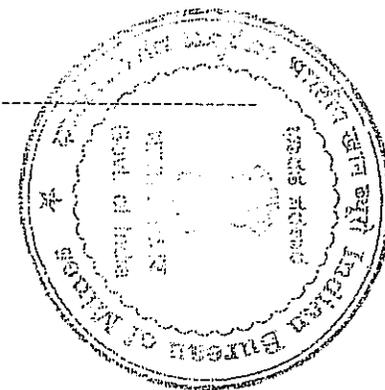
BOREHOLE NO:MKMR-10

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
15.00 16.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.71	0.54	2.55	
16.00 17.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.84	1.12	3.06	
17.00 18.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.66	0.52	4.59	
18.00 19.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.57	0.48	1.32	
19.00 20.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.78	0.96	5.61	
20.00 21.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.73	0.72	5.86	
21.00 22.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.00	0.92	5.09	
22.00 23.00	1.00	HEMATITIC ORE	REDDISH BROWN	60.51	1.12	7.64	
23.00 24.00	1.00	SHALY ORE	REDDISH BROWN	49.39	0.62	15.80	
24.00 25.00	1.00	SHALY ORE	REDDISH BROWN	47.18	1.04	17.34	
25.00 26.00	1.00	SHALY ORE	REDDISH BROWN	50.81	1.06	15.30	
26.00 27.00	1.00	SHALY ORE	REDDISH BROWN	48.83	1.06	14.78	
27.00 28.00	1.00	SHALY ORE	REDDISH BROWN	46.87	4.32	16.82	
28.00 29.00	1.00	SHALY ORE	REDDISH BROWN	44.66	3.82	19.37	
29.00 30.00	1.00	SHALY ORE	REDDISH BROWN	43.21	3.69	20.87	
30.00 31.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.10	4.87	2.54	
31.00 32.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.49	4.64	4.08	
32.00 33.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.31	6.33	2.54	
33.00 34.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.09	6.15	1.52	



BOREHOLE NO:MKMR-10

DEPTH (M)		THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO							
34.00	35.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.98	2.96	2.04	
35.00	36.00	1.00	HEMATITIC ORE	REDDISH BROWN	66.09	3.53	1.52	
36.00	37.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.19	4.58	2.04	
37.00	38.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.82	4.55	1.54	
38.00	39.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.99	3.19	2.04	
39.00	40.00	1.00	BLUE DUST	BL GREY	67.47	2.49	1.01	
40.00	41.00	1.00	BLUE DUST	BL GREY	66.93	1.92	1.52	
41.00	42.00	1.00	BLUE DUST	BL GREY	66.50	2.10	1.52	
42.00	43.00	1.00	BLUE DUST	BL GREY	64.12	1.72	1.52	
43.00	44.00	1.00	BLUE DUST	BL GREY	66.10	2.08	2.54	
44.00	45.00	1.00	BLUE DUST	BL GREY	66.90	2.51	1.52	
45.00	46.00	1.00	BLUE DUST	BL GREY	66.23	2.28	1.52	
46.00	47.00	1.00	BLUE DUST	BL GREY	67.26	1.78	1.52	
47.00	48.00	1.00	BLUE DUST	BL GREY	65.53	3.02	2.55	
48.00	49.00	1.00	BLUE DUST	BL GREY	66.70	1.62	1.52	
49.00	50.00	1.00	BLUE DUST	BL GREY	66.70	1.62	1.01	
50.00	51.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.51	1.64	3.57	
51.00	52.00	1.00	HEMATITIC ORE	REDDISH BROWN	60.49	7.26	1.53	
52.00	53.00	1.00	HEMATITIC ORE	REDDISH BROWN	60.84	6.14	1.53	



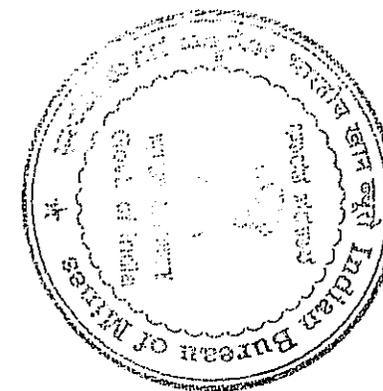
BOREHOLE NO:MKMR-10

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
53.00 54.00	1.00	HEMATITIC ORE	REDDISH BROWN	61.89	7.88	1.53	
54.00 55.00	1.00	HEMATITIC ORE	REDDISH BROWN	62.21	7.00	1.53	
55.00 56.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.89	2.32	1.52	
56.00 57.00	1.00	HEMATITIC ORE	REDDISH BROWN	66.53	2.54	2.03	
57.00 58.00	1.00	HEMATITIC ORE	REDDISH BROWN	62.50	6.45	1.52	
58.00 59.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.26	2.86	1.52	
59.00 60.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.51	5.24	2.04	OCC SHALY
60.00 61.00	1.00	HEMATITIC ORE	REDDISH BROWN	61.48	7.77	3.56	OCC SHALY
61.00 62.00	1.00	HEMATITIC ORE	REDDISH BROWN	62.64	4.84	3.56	OCC SHALY
62.00 63.00	1.00	HEMATITIC ORE	REDDISH BROWN	63.22	6.98	1.53	
63.00 64.00	1.00	HEMATITIC ORE	REDDISH BROWN	61.60	7.43	3.05	
64.00 65.00	1.00	HEMATITIC ORE	REDDISH BROWN	64.91	2.96	2.55	
65.00 66.00	1.00	HEMATITIC ORE	REDDISH BROWN	61.51	5.69	5.09	
66.00 67.00	1.00	HEMATITIC ORE	REDDISH BROWN	60.10	6.13	6.11	
67.00 68.00	1.00	HEMATITIC ORE	LIGHT BROWN	58.56	7.21	6.62	OCC SHALY
68.00 69.00	1.00	HEMATITIC ORE	LIGHT BROWN	56.06	9.05	8.66	OCC SHALY
69.00 70.00	1.00	HEMATITIC ORE	LIGHT BROWN	53.31	9.84	10.19	OCC SHALY
70.00 71.00	1.00	HEMATITIC ORE	LIGHT BROWN	54.66	9.19	8.86	OCC SHALY
71.00 72.00	1.00	HEMATITIC ORE	LIGHT BROWN	47.99	13.87	14.52	OCC SHALY



BOREHOLE NO:MKMR-10

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
FROM	TO						
72.00	73.00	1.00 SILICIOUS IRON ORE	LIGHT BROWN	39.62	19.62	16.30	
73.00	74.00	1.00 SILICIOUS IRON ORE	LIGHT BROWN	34.06	23.04	19.38	
74.00	75.00	1.00 SILICIOUS IRON ORE	LIGHT BROWN	32.35	23.65	20.37	
75.00	76.00	1.00 HEMATITIC ORE	LIGHT BROWN	47.95	13.94	11.46	
76.00	77.00	1.00 HEMATITIC ORE	LIGHT BROWN	52.49	10.62	9.69	
77.00	78.00	1.00 HEMATITIC ORE	LIGHT BROWN	37.64	20.69	17.32	
78.00	79.00	1.00 SHALE	LIGHT BROWN	8.65	40.38	35.17	
79.00	80.00	1.00 SHALE	LIGHT BROWN	9.48	40.00	34.88	



DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL IN  
M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-11

LATITUDE : 1333058.336  
LONGITUDE : 2844886.551  
REDUCED LEVEL (M): 1031.160

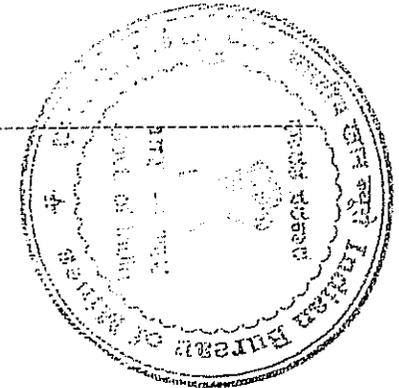
DATE OF COMMENCEMENT : 13.09.2014  
DATE OF CLOSURE : 13.09.2014  
DEPTH DRILLED (M) : 60.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO						
0.00	1.00	FERRUGINOUS SHALE	REDDISH BROWN	26.46	27.70	22.32	
1.00	2.00	FERRUGINOUS SHALE	REDDISH BROWN	23.24	28.79	24.80	
2.00	3.00	FERRUGINOUS SHALE	REDDISH BROWN	26.18	28.08	22.78	
3.00	4.00	FERRUGINOUS SHALE	REDDISH BROWN	24.64	27.98	23.71	
4.00	5.00	FERRUGINOUS SHALE	REDDISH BROWN	29.40	25.45	19.99	
5.00	6.00	HEMATITIC ORE	REDDISH BROWN	44.38	14.39	12.12	
6.00	7.00	HEMATITIC ORE	REDDISH BROWN	55.30	4.38	5.29	
7.00	8.00	FERRUGINOUS SHALE	DARK BROWN	27.72	25.00	20.84	
8.00	9.00	FERRUGINOUS SHALE	DARK BROWN	24.64	29.03	23.32	
9.00	10.00	SHALY ORE	DARK BROWN	31.08	23.31	18.35	
10.00	11.00	SHALY ORE	DARK BROWN	32.20	24.53	15.24	
11.00	12.00	SHALY ORE	DARK BROWN	43.40	14.38	13.84	
12.00	13.00	SHALY ORE	DARK BROWN	33.18	21.81	18.03	
13.00	14.00	SHALY ORE	DARK BROWN	34.72	21.72	17.73	
14.00	15.00	SHALY ORE	DARK BROWN	47.86	12.49	9.95	



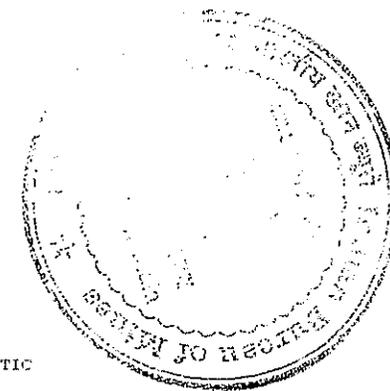
BOREHOLE NO:MMR-11

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
15.00 16.00	1.00	SHALY ORE	DARK BROWN	46.34	13.98	12.60	
16.00 17.00	1.00	SHALY ORE	DARK BROWN	37.80	18.64	15.86	
17.00 18.00	1.00	SHALY ORE	DARK BROWN	38.04	17.77	11.34	
18.00 19.00	1.00	SHALY ORE	DARK BROWN	33.85	21.46	18.19	
19.00 20.00	1.00	SHALY ORE	DARK BROWN	43.92	13.97	11.11	
20.00 21.00	1.00	SHALY ORE	DARK BROWN	37.48	17.96	12.76	
21.00 22.00	1.00	SHALY ORE	DARK BROWN	35.94	19.70	14.65	
22.00 23.00	1.00	HEMATITIC ORE	DARK BROWN	45.87	12.70	9.45	
23.00 24.00	1.00	HEMATITIC ORE	DARK BROWN	47.13	12.15	7.80	
24.00 25.00	1.00	HEMATITIC ORE	DARK BROWN	33.29	22.94	15.83	
25.00 26.00	1.00	HEMATITIC ORE	DARK BROWN	34.82	20.76	15.36	
26.00 27.00	1.00	HEMATITIC ORE	DARK BROWN	55.38	6.68	4.73	
27.00 28.00	1.00	HEMATITIC ORE	DARK BROWN	60.28	3.75	2.36	
28.00 29.00	1.00	HEMATITIC ORE	DARK BROWN	58.88	4.57	2.84	
29.00 30.00	1.00	HEMATITIC ORE	DARK BROWN	59.08	5.64	3.73	
30.00 31.00	1.00	HEMATITIC ORE	DARK BROWN	55.30	7.31	3.70	
31.00 32.00	1.00	HEMATITIC ORE	DARK BROWN	41.16	16.82	14.30	
32.00 33.00	1.00	HEMATITIC ORE	DARK BROWN	35.28	20.72	17.72	
33.00 34.00	1.00	HEMATITIC ORE	REDDISH BROWN	53.20	7.48	6.53	



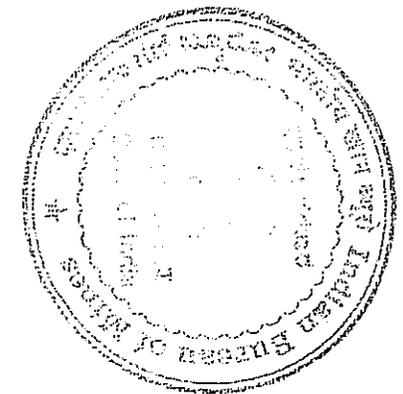
BOREHOLE NO:MKHR-11

DEPTH (M)		THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO							
34.00	35.00	1.00	HEMATITIC ORE	REDDISH BROWN	59.64	4.45	4.67	
35.00	36.00	1.00	HEMATITIC ORE	REDDISH BROWN	58.52	6.58	5.59	
36.00	37.00	1.00	HEMATITIC ORE	REDDISH BROWN	59.08	5.10	4.35	
37.00	38.00	1.00	HEMATITIC ORE	REDDISH BROWN	48.44	11.93	9.95	
38.00	39.00	1.00	HEMATITIC ORE	REDDISH BROWN	34.44	20.90	16.79	
39.00	40.00	1.00	HEMATITIC ORE	REDDISH BROWN	46.76	13.83	10.57	
40.00	41.00	1.00	HEMATITIC ORE	REDDISH BROWN	42.84	18.52	10.26	
41.00	42.00	1.00	HEMATITIC ORE	REDDISH BROWN	46.43	14.58	10.16	
42.00	43.00	1.00	HEMATITIC ORE	REDDISH BROWN	36.64	20.12	10.16	
43.00	44.00	1.00	HEMATITIC ORE	REDDISH BROWN	53.00	9.27	9.22	
44.00	45.00	1.00	HEMATITIC ORE	REDDISH BROWN	39.44	18.38	13.47	
45.00	46.00	1.00	HEMATITIC ORE	REDDISH BROWN	48.11	14.04	13.70	
46.00	47.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	42.10	16.75	6.85	LIMONITIC
47.00	48.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	52.03	8.12	11.58	LIMONITIC
48.00	49.00	1.00	SILICIOUS IRON ORE	YELLOWISH BROWN	38.18	17.00	9.45	
49.00	50.00	1.00	SILICIOUS IRON ORE	YELLOWISH BROWN	38.74	16.94	13.94	
50.00	51.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	46.85	12.35	6.85	SHALY
51.00	52.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	45.73	11.48	15.12	SHALY
52.00	53.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	45.17	11.03	10.16	SHALY



BOREHOLE NO:MKMR-11

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
53.00 54.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	52.08	7.17	5.43	
54.00 55.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	56.56	4.54	4.25	
55.00 56.00	1.00	HEMATITIC ORE	YELLOWISH BROWN	47.46	12.59	8.74	
56.00 57.00	1.00	HEMATITIC ORE	GREYISH WHITE-BROW	47.18	12.61	9.21	
57.00 58.00	1.00	HEMATITIC ORE	GREYISH WHITE-BROW	48.02	10.56	8.26	
58.00 59.00	1.00	HEMATITIC ORE	GREYISH WHITE-BROW	49.42	9.74	8.03	
59.00 60.00	1.00	HEMATITIC ORE	GREYISH WHITE-BROW	49.28	9.68	8.26	





BOREHOLE NO:MKHR-12

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
15.00 16.00	1.00	FERRUGINOUS SHALE	DARK BROWN	34.34	23.86	20.91	
16.00 17.00	1.00	FERRUGINOUS SHALE	DARK BROWN	30.01	24.42	20.40	
17.00 18.00	1.00	FERRUGINOUS SHALE	DARK BROWN	40.20	18.32	16.31	
18.00 19.00	1.00	FERRUGINOUS SHALE	DARK BROWN	36.13	21.65	19.37	
19.00 20.00	1.00	FERRUGINOUS SHALE	DARK BROWN	33.73	23.16	20.88	
20.00 21.00	1.00	FERRUGINOUS SHALE	DARK BROWN	33.63	24.00	20.39	
21.00 22.00	1.00	FERRUGINOUS SHALE	DARK BROWN	41.47	19.16	15.81	
22.00 23.00	1.00	FERRUGINOUS SHALE	DARK BROWN	34.68	22.97	19.88	
23.00 24.00	1.00	FERRUGINOUS SHALE	DARK BROWN	32.66	27.12	18.61	
24.00 25.00	1.00	FERRUGINOUS SHALE	DARK BROWN	32.34	24.75	20.88	
25.00 26.00	1.00	FERRUGINOUS SHALE	DARK BROWN	33.50	24.18	20.65	
26.00 27.00	1.00	SILICIOUS IRON ORE	DARK BROWN	39.33	20.94	17.07	
27.00 28.00	1.00	SILICIOUS IRON ORE	DARK BROWN	35.84	23.26	18.85	
28.00 29.00	1.00	HEMATITIC ORE	DARK BROWN	58.03	6.91	5.10	
29.00 30.00	1.00	HEMATITIC ORE	DARK BROWN	59.13	5.49	4.01	
30.00 31.00	1.00	FERRUGINOUS SHALE	DARK BROWN	39.04	22.71	15.28	
31.00 32.00	1.00	FERRUGINOUS SHALE	DARK BROWN	38.53	20.94	17.08	
32.00 33.00	1.00	SILICIOUS IRON ORE	DARK BROWN	42.44	18.12	14.28	
33.00 34.00	1.00	SILICIOUS IRON ORE	DARK BROWN	41.81	18.37	15.53	

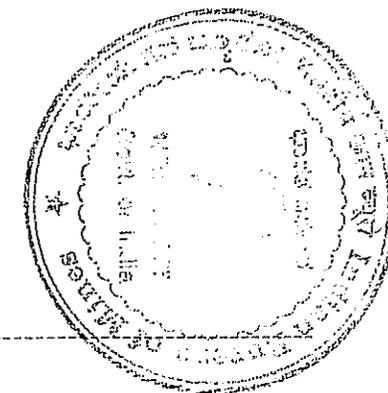
BOREHOLE NO:MKHR-12

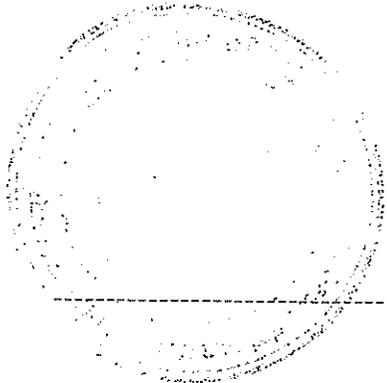
DEPTH (M) FROM TO	THICKNESS (M)	LITROLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
34.00 35.00	1.00	SILICIOUS IRON ORE	DARK BROWN	37.94	20.38	16.82	
35.00 36.00	1.00	SILICIOUS IRON ORE	DARK BROWN	48.55	13.51	11.21	
36.00 37.00	1.00	FERRUGINOUS SHALE	YELLOWISH BROWN	32.49	23.67	20.63	
37.00 38.00	1.00	SILICIOUS IRON ORE	YELLOWISH BROWN	48.16	12.44	11.47	
38.00 39.00	1.00	SILICIOUS IRON ORE	DARK BROWN	49.73	13.97	11.72	
39.00 40.00	1.00	SILICIOUS IRON ORE	DARK BROWN	44.91	15.40	13.25	
40.00 41.00	1.00	SILICIOUS IRON ORE	DARK BROWN	40.76	18.69	15.81	
41.00 42.00	1.00	HEMATITIC ORE	DARK BROWN	47.18	14.24	12.75	
42.00 43.00	1.00	HEMATITIC ORE	DARK BROWN	60.48	3.87	4.59	
43.00 44.00	1.00	HEMATITIC ORE	DARK BROWN	40.72	21.23	14.52	
44.00 45.00	1.00	HEMATITIC ORE	DARK BROWN	36.24	23.90	16.55	
45.00 46.00	1.00	HEMATITIC ORE	DARK BROWN	60.25	3.77	4.33	
46.00 47.00	1.00	HEMATITIC ORE	DARK BROWN	64.78	2.84	3.06	
47.00 48.00	1.00	HEMATITIC ORE	DARK BROWN	57.97	6.90	6.11	
48.00 49.00	1.00	SHALE	LIGHT BROWN	26.79	27.46	23.96	
49.00 50.00	1.00	SHALE	LIGHT BROWN	19.24	33.39	28.78	
50.00 51.00	1.00	HEMATITIC ORE	GREY BROWN	48.86	12.60	11.47	
51.00 52.00	1.00	HEMATITIC ORE	GREY BROWN	54.16	9.20	11.97	
52.00 53.00	1.00	HEMATITIC ORE	GREY BROWN	57.54	7.84	7.14	



BOREHOLE NO:MKMR-12

DEPTH (M)		THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO							
53.00	54.00	1.00	HEMATITIC ORE	DARK BROWN	59.78	6.74	5.35	
54.00	55.00	1.00	FERRUGINOUS SHALE	DARK BROWN	27.86	26.24	8.92	
55.00	56.00	1.00	FERRUGINOUS SHALE	DARK BROWN	17.22	35.08	29.58	
56.00	57.00	1.00	SHALY ORE	DARK BROWN	37.10	21.52	18.61	
57.00	58.00	1.00	SHALY ORE	DARK BROWN	37.66	20.56	19.63	
58.00	59.00	1.00	SHALY ORE	DARK BROWN	43.96	17.76	15.81	
59.00	60.00	1.00	SHALY ORE	DARK BROWN	39.20	18.92	16.06	
60.00	61.00	1.00	SHALY ORE	DARK BROWN	29.12	26.32	23.46	
61.00	62.00	1.00	SHALY ORE	DARK BROWN	35.84	22.30	19.89	
62.00	63.00	1.00	SILICIOUS IRON ORE	DARK BROWN	45.08	16.94	15.04	
63.00	64.00	1.00	SILICIOUS IRON ORE	DARK BROWN	40.60	18.22	17.08	
64.00	65.00	1.00	SILICIOUS IRON ORE	DARK BROWN	43.40	16.76	15.30	
65.00	66.00	1.00	SILICIOUS IRON ORE	DARK BROWN	40.74	18.82	16.57	
66.00	67.00	1.00	SILICIOUS IRON ORE	LIGHT BROWN	41.02	18.62	15.55	
67.00	68.00	1.00	HEMATITIC ORE	LIGHT BROWN	45.50	15.58	14.02	
68.00	69.00	1.00	HEMATITIC ORE	LIGHT BROWN	46.06	15.94	14.53	
69.00	70.00	1.00	HEMATITIC ORE	LIGHT BROWN	47.18	13.64	13.00	
70.00	71.00	1.00	HEMATITIC ORE	LIGHT BROWN	43.68	17.28	14.79	
71.00	72.00	1.00	HEMATITIC ORE	LIGHT BROWN	44.38	16.56	14.02	





ITEM NO.	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE	TAX	NET TOTAL
1	SITTING ROOM ONE	1.00	17.00	17.00		17.00
2	SITTING ROOM ONE	1.00	21.00	21.00		21.00
3	SHAWL ONE	1.00	25.00	25.00		25.00
4	SHAWL ONE	1.00	29.00	29.00		29.00
5	SHAWL ONE	1.00	33.00	33.00		33.00
6	SHAWL ONE	1.00	37.00	37.00		37.00
7	SHAWL ONE	1.00	41.00	41.00		41.00
8	SHAWL ONE	1.00	45.00	45.00		45.00
9	SHAWL ONE	1.00	49.00	49.00		49.00
10	SHAWL ONE	1.00	53.00	53.00		53.00
11	SHAWL ONE	1.00	57.00	57.00		57.00
12	SHAWL ONE	1.00	61.00	61.00		61.00
13	SHAWL ONE	1.00	65.00	65.00		65.00
14	SHAWL ONE	1.00	69.00	69.00		69.00
15	SHAWL ONE	1.00	73.00	73.00		73.00
16	SHAWL ONE	1.00	77.00	77.00		77.00
17	SHAWL ONE	1.00	81.00	81.00		81.00
18	SHAWL ONE	1.00	85.00	85.00		85.00
19	SHAWL ONE	1.00	89.00	89.00		89.00
20	SHAWL ONE	1.00	93.00	93.00		93.00
21	SHAWL ONE	1.00	97.00	97.00		97.00
22	SHAWL ONE	1.00	101.00	101.00		101.00
23	SHAWL ONE	1.00	105.00	105.00		105.00
24	SHAWL ONE	1.00	109.00	109.00		109.00
25	SHAWL ONE	1.00	113.00	113.00		113.00
26	SHAWL ONE	1.00	117.00	117.00		117.00
27	SHAWL ONE	1.00	121.00	121.00		121.00
28	SHAWL ONE	1.00	125.00	125.00		125.00
29	SHAWL ONE	1.00	129.00	129.00		129.00
30	SHAWL ONE	1.00	133.00	133.00		133.00
31	SHAWL ONE	1.00	137.00	137.00		137.00
32	SHAWL ONE	1.00	141.00	141.00		141.00
33	SHAWL ONE	1.00	145.00	145.00		145.00
34	SHAWL ONE	1.00	149.00	149.00		149.00
35	SHAWL ONE	1.00	153.00	153.00		153.00
36	SHAWL ONE	1.00	157.00	157.00		157.00
37	SHAWL ONE	1.00	161.00	161.00		161.00
38	SHAWL ONE	1.00	165.00	165.00		165.00
39	SHAWL ONE	1.00	169.00	169.00		169.00
40	SHAWL ONE	1.00	173.00	173.00		173.00
41	SHAWL ONE	1.00	177.00	177.00		177.00
42	SHAWL ONE	1.00	181.00	181.00		181.00
43	SHAWL ONE	1.00	185.00	185.00		185.00
44	SHAWL ONE	1.00	189.00	189.00		189.00
45	SHAWL ONE	1.00	193.00	193.00		193.00
46	SHAWL ONE	1.00	197.00	197.00		197.00
47	SHAWL ONE	1.00	201.00	201.00		201.00
48	SHAWL ONE	1.00	205.00	205.00		205.00
49	SHAWL ONE	1.00	209.00	209.00		209.00
50	SHAWL ONE	1.00	213.00	213.00		213.00
51	SHAWL ONE	1.00	217.00	217.00		217.00
52	SHAWL ONE	1.00	221.00	221.00		221.00
53	SHAWL ONE	1.00	225.00	225.00		225.00
54	SHAWL ONE	1.00	229.00	229.00		229.00
55	SHAWL ONE	1.00	233.00	233.00		233.00
56	SHAWL ONE	1.00	237.00	237.00		237.00
57	SHAWL ONE	1.00	241.00	241.00		241.00
58	SHAWL ONE	1.00	245.00	245.00		245.00
59	SHAWL ONE	1.00	249.00	249.00		249.00
60	SHAWL ONE	1.00	253.00	253.00		253.00
61	SHAWL ONE	1.00	257.00	257.00		257.00
62	SHAWL ONE	1.00	261.00	261.00		261.00
63	SHAWL ONE	1.00	265.00	265.00		265.00
64	SHAWL ONE	1.00	269.00	269.00		269.00
65	SHAWL ONE	1.00	273.00	273.00		273.00
66	SHAWL ONE	1.00	277.00	277.00		277.00
67	SHAWL ONE	1.00	281.00	281.00		281.00
68	SHAWL ONE	1.00	285.00	285.00		285.00
69	SHAWL ONE	1.00	289.00	289.00		289.00
70	SHAWL ONE	1.00	293.00	293.00		293.00
71	SHAWL ONE	1.00	297.00	297.00		297.00
72	SHAWL ONE	1.00	301.00	301.00		301.00
73	SHAWL ONE	1.00	305.00	305.00		305.00
74	SHAWL ONE	1.00	309.00	309.00		309.00
75	SHAWL ONE	1.00	313.00	313.00		313.00
76	SHAWL ONE	1.00	317.00	317.00		317.00
77	SHAWL ONE	1.00	321.00	321.00		321.00
78	SHAWL ONE	1.00	325.00	325.00		325.00
79	SHAWL ONE	1.00	329.00	329.00		329.00
80	SHAWL ONE	1.00	333.00	333.00		333.00
81	SHAWL ONE	1.00	337.00	337.00		337.00
82	SHAWL ONE	1.00	341.00	341.00		341.00
83	SHAWL ONE	1.00	345.00	345.00		345.00
84	SHAWL ONE	1.00	349.00	349.00		349.00
85	SHAWL ONE	1.00	353.00	353.00		353.00
86	SHAWL ONE	1.00	357.00	357.00		357.00
87	SHAWL ONE	1.00	361.00	361.00		361.00
88	SHAWL ONE	1.00	365.00	365.00		365.00
89	SHAWL ONE	1.00	369.00	369.00		369.00
90	SHAWL ONE	1.00	373.00	373.00		373.00
91	SHAWL ONE	1.00	377.00	377.00		377.00
92	SHAWL ONE	1.00	381.00	381.00		381.00
93	SHAWL ONE	1.00	385.00	385.00		385.00
94	SHAWL ONE	1.00	389.00	389.00		389.00
95	SHAWL ONE	1.00	393.00	393.00		393.00
96	SHAWL ONE	1.00	397.00	397.00		397.00
97	SHAWL ONE	1.00	401.00	401.00		401.00
98	SHAWL ONE	1.00	405.00	405.00		405.00
99	SHAWL ONE	1.00	409.00	409.00		409.00
100	SHAWL ONE	1.00	413.00	413.00		413.00

FORM NO. 10-11-12

DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL IN  
M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-13

LATITUDE : 1233172.174  
LONGITUDE : 2844596.979  
REDUCED LEVEL (M): 1006.409

DATE OF COMMENCEMENT : 14.09.2014  
DATE OF CLOSURE : 14.09.2014  
DEPTH DRILLED (M) : 50.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO						
0.00	1.00	SHALY ORE	DARK BROWN	35.28	12.76	22.18	LIMONITIC
1.00	2.00	FERRUGINOUS SHALE	DARK BROWN	32.48	23.08	20.91	
2.00	3.00	FERRUGINOUS SHALE	DARK BROWN	33.46	21.40	19.89	
3.00	4.00	FERRUGINOUS SHALE	DARK BROWN	34.30	21.10	18.36	
4.00	5.00	FERRUGINOUS SHALE	DARK BROWN	30.52	24.96	21.93	
5.00	6.00	FERRUGINOUS SHALE	DARK BROWN	33.32	23.66	20.65	
6.00	7.00	FERRUGINOUS SHALE	DARK BROWN	31.78	23.78	21.67	
7.00	8.00	SHALE	WHITE	22.26	30.36	25.49	
8.00	9.00	SHALE	WHITE	18.06	32.92	27.79	
9.00	10.00	SHALE	WHITE	24.50	28.24	25.50	
10.00	11.00	SHALE	PINKISH GREY	23.41	30.51	27.24	
11.00	12.00	SHALE	PINKISH GREY	23.87	29.77	25.24	
12.00	13.00	SHALE	PINKISH GREY	26.10	28.58	23.97	
13.00	14.00	SHALE	PINKISH GREY	29.85	26.28	22.42	
14.00	15.00	SHALE	PINKISH GREY	25.97	28.14	24.99	

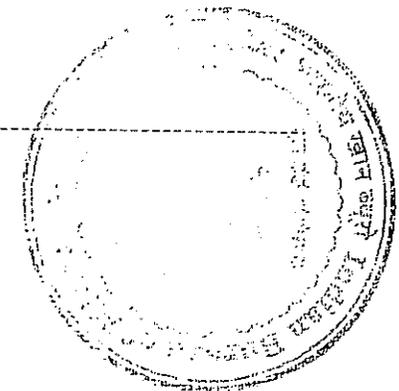
BOREHOLE NO. BH-13

DEPTH (ft)	THICKNESS	LITHOLOGY	PER	STOR	ALLOS	REMARKS
15.00	1.00	SHALE	23.75	23.86	19.37	
16.00	1.00	SHALE	24.59	22.80	19.87	
17.00	1.00	SHALE	31.27	25.02	21.42	
18.00	1.00	SHALE	27.89	27.65	22.89	
19.00	1.00	SHALE	32.90	24.56	20.27	
20.00	1.00	SHALE	29.88	25.80	22.43	
21.00	1.00	SHALE	25.41	28.38	24.74	
22.00	1.00	SHALE	23.93	30.72	28.01	
23.00	1.00	SHALE	11.39	38.24	32.11	
24.00	1.00	SHALE	11.18	38.29	31.85	
25.00	1.00	SHALE	5.72	40.41	34.16	
26.00	1.00	SHALE	5.86	39.43	33.41	
27.00	1.00	SHALE	8.66	40.25	34.18	
28.00	1.00	SHALE	10.21	37.50	32.84	
29.00	1.00	SHALE	11.15	38.44	33.12	
30.00	1.00	LIGHT BROWN	21.62	30.20	28.25	
31.00	1.00	LIGHT BROWN	19.92	32.09	29.50	
32.00	1.00	LIGHT BROWN	22.05	28.88	24.73	
33.00	1.00	LIGHT BROWN	23.71	29.68	24.71	



BOREHOLE NO:MKMR-13

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
34.00 35.00	1.00	SHALE	LIGHT BROWN	20.35	31.32	26.48	
35.00 36.00	1.00	SHALE	LIGHT BROWN	35.42	21.27	19.10	
36.00 37.00	1.00	SHALE	LIGHT BROWN	32.24	24.14	19.89	
37.00 38.00	1.00	SHALE	LIGHT BROWN	26.78	28.52	22.67	
38.00 39.00	1.00	SHALE	LIGHT BROWN	27.63	28.15	21.66	
39.00 40.00	1.00	SHALE	LIGHT BROWN	33.74	23.74	17.06	
40.00 41.00	1.00	SHALE	PINKISH GREY	24.70	30.98	21.92	
41.00 42.00	1.00	SHALE	PINKISH GREY	22.33	33.83	23.97	
42.00 43.00	1.00	SHALE	PINKISH GREY	32.24	28.90	19.84	
43.00 44.00	1.00	SHALE	PINKISH GREY	14.92	40.85	20.38	
44.00 45.00	1.00	SHALE	PINKISH GREY	14.79	55.03	16.31	
45.00 46.00	1.00	SHALE	PINKISH GREY	13.12	61.50	13.51	
46.00 47.00	1.00	SHALE	PINKISH GREY	14.36	58.99	15.28	
47.00 48.00	1.00	SHALE	PINKISH GREY	11.72	62.38	15.02	
48.00 49.00	1.00	SHALE	PINKISH GREY	14.09	62.26	15.04	
49.00 50.00	1.00	SHALE	PINKISH GREY	18.82	49.15	17.06	



DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL IN  
M/S KARTHINEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:HKMP-14

LATITUDE : 1323094.661  
LONGITUDE : 2844640.603  
REDUCED LEVEL (M): 958.916

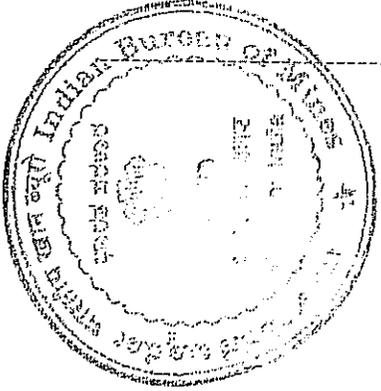
DATE OF COMMENCEMENT : 14.09.2014  
DATE OF CLOSURE : 14.09.2014  
DEPTH DRILLED (M) : 50.00

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
FROM	TO						
0.00	1.00	FERRUGINOUS SHALE	DARK BROWN	35.84	22.76	15.79	
1.00	2.00	FERRUGINOUS SHALE	DARK BROWN	34.29	22.37	19.09	
2.00	3.00	SHALE	LIGHT BROWN	17.85	32.43	28.79	
3.00	4.00	SHALE	LIGHT BROWN	10.60	36.61	30.83	
4.00	5.00	SHALE	LIGHT BROWN	12.96	35.12	29.53	
5.00	6.00	SHALE	LIGHT BROWN	24.12	27.97	23.69	
6.00	7.00	FERRUGINOUS SHALE	LIGHT BROWN	31.25	24.87	20.90	
7.00	8.00	FERRUGINOUS SHALE	LIGHT BROWN	28.05	26.49	22.43	
8.00	9.00	FERRUGINOUS SHALE	LIGHT BROWN	26.53	27.42	22.95	
9.00	10.00	FERRUGINOUS SHALE	LIGHT BROWN	20.21	31.44	28.01	
10.00	11.00	SHALE	LIGHT BROWN	18.42	34.04	28.56	
11.00	12.00	SHALE	LIGHT BROWN	4.46	43.76	34.41	
12.00	13.00	SHALE	LIGHT BROWN	7.25	40.70	33.87	
13.00	14.00	SHALE	LIGHT BROWN	15.48	35.54	29.56	
14.00	15.00	SHALE	LIGHT BROWN	13.40	41.94	26.77	



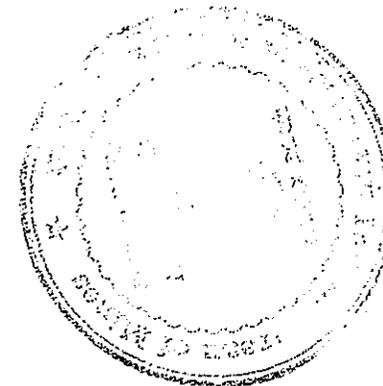
BOREHOLE NO:MKMR-14

DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SLOC	ALCO3	REMARKS
15.00	16.00	SHALE	GREY BROWN	8.23	59.18	20.65	
16.00	17.00	SHALE	GREY BROWN	5.85	65.54	18.34	
17.00	18.00	SHALE	GREY BROWN	4.32	71.48	15.55	
18.00	19.00	SHALE	GREY BROWN	5.57	67.78	18.34	
19.00	20.00	SHALE	GREY BROWN	6.28	68.15	16.82	
20.00	21.00	SHALE	GREY BROWN	5.57	68.09	17.57	
21.00	22.00	SHALE	GREY BROWN	5.30	67.78	17.59	
22.00	23.00	SHALE	GREY BROWN	6.69	66.00	16.80	
23.00	24.00	SHALE	GREY BROWN	5.02	66.27	17.58	
24.00	25.00	SHALE	GREYISH WHITE	5.57	68.16	17.32	
25.00	26.00	SHALE	DARK BROWN	3.35	70.32	17.08	
26.00	27.00	SHALE	DARK BROWN	4.73	69.27	16.80	
27.00	28.00	SHALE	DARK BROWN	5.58	71.43	16.31	
28.00	29.00	SHALE	DARK BROWN	8.38	66.78	16.32	
29.00	30.00	SHALE	DARK BROWN	4.75	68.52	17.34	
30.00	31.00	SHALE	DARK BROWN	3.63	68.56	18.11	
31.00	32.00	SHALE	WHITE	5.86	67.84	17.59	
32.00	33.00	SHALE	WHITE	5.29	69.32	16.81	
33.00	34.00	SHALE	WHITE	4.74	69.30	17.07	



BOREHOLE NO:MMR-14

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO2	AL2O3	REMARKS
34.00 35.00	1.00	SHALE	WHITE	6.14	68.08	15.55	
35.00 36.00	1.00	SHALE	WHITE	6.13	68.22	15.79	
36.00 37.00	1.00	SHALE	LIGHT BROWN	5.16	71.54	15.80	
37.00 38.00	1.00	SHALE	LIGHT BROWN	5.99	68.95	15.79	
38.00 39.00	1.00	SHALE	LIGHT BROWN	4.18	70.08	17.82	
39.00 40.00	1.00	SHALE	LIGHT BROWN	3.36	69.72	16.32	
40.00 41.00	1.00	SHALE	LIGHT BROWN	4.47	68.70	16.83	
41.00 42.00	1.00	SHALE	LIGHT BROWN	5.02	68.42	16.32	
42.00 43.00	1.00	SHALE	LIGHT BROWN	4.18	70.41	16.04	
43.00 44.00	1.00	SHALE	LIGHT BROWN	3.91	69.16	17.08	
44.00 45.00	1.00	SHALE	GREYISH WHITE	2.51	70.18	17.82	
45.00 46.00	1.00	SHALE	GREYISH WHITE	3.91	67.22	17.33	
46.00 47.00	1.00	SHALE	GREYISH WHITE	4.46	69.47	16.81	
47.00 48.00	1.00	SHALE	DARK BROWN	4.61	71.92	15.30	
48.00 49.00	1.00	SHALE	LIGHT BROWN	2.83	71.81	16.04	
49.00 50.00	1.00	SHALE	LIGHT BROWN	3.34	72.00	15.78	



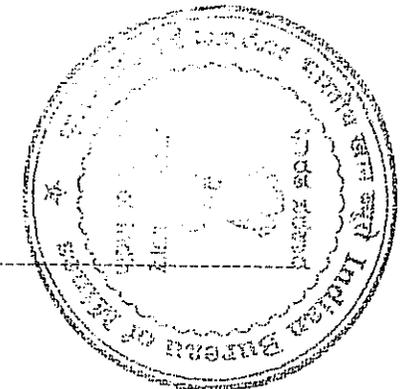
DETAILED LITHOLOG AND ANALYTICAL DETAILS OF BOREHOLES (REVERSE CIRCULATION) DRILLED BY MECL IN  
M/s KARTHIKEYAS MANGANESE AND IRON ORES Ltd. LEASE AREA (ML No.2559), DIST: BELLARY, KARNATAKA

BOREHOLE NO:MKMR-15

LATITUDE : 1333198.586  
LONGITUDE : 2845062.823  
REDUCED LEVEL (M): 982.696

DATE OF COMMENCEMENT : 14.09.2014  
DATE OF CLOSURE : 14.09.2014  
DEPTH DRILLED (M) : 150.00

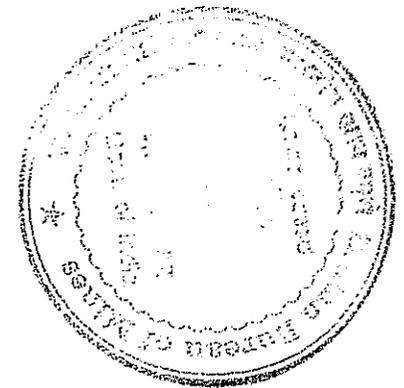
DEPTH (M)	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
FROM	TO						
0.00	1.00	HEMATITIC ORE	DARK BROWN	52.43	9.93	9.68	
1.00	2.00	HEMATITIC ORE	DARK BROWN	57.71	4.75	8.15	
2.00	3.00	HEMATITIC ORE	YELLOWISH BROWN	57.70	0.62	1.02	LIMONITIC
3.00	4.00	HEMATITIC ORE	YELLOWISH BROWN	61.22	3.32	7.13	LIMONITIC
4.00	5.00	HEMATITIC ORE	DARK BROWN	56.94	2.02	7.39	
5.00	6.00	HEMATITIC ORE	DARK BROWN	57.78	2.48	8.16	
6.00	7.00	HEMATITIC ORE	DARK BROWN	60.10	1.92	6.11	
7.00	8.00	HEMATITIC ORE	DARK BROWN	61.52	1.22	4.84	
8.00	9.00	HEMATITIC ORE	DARK BROWN	57.47	2.50	6.11	
9.00	10.00	HEMATITIC ORE	DARK BROWN	54.36	4.03	7.38	
10.00	11.00	HEMATITIC ORE	REDDISH BROWN	57.48	3.48	6.63	
11.00	12.00	HEMATITIC ORE	REDDISH BROWN	67.72	0.62	1.53	
12.00	13.00	HEMATITIC ORE	REDDISH BROWN	59.75	2.72	4.59	
13.00	14.00	HEMATITIC ORE	REDDISH BROWN	60.87	1.08	3.06	
14.00	15.00	HEMATITIC ORE	REDDISH BROWN	63.66	1.20	3.06	



BOREHOLE NO:MKMR-15

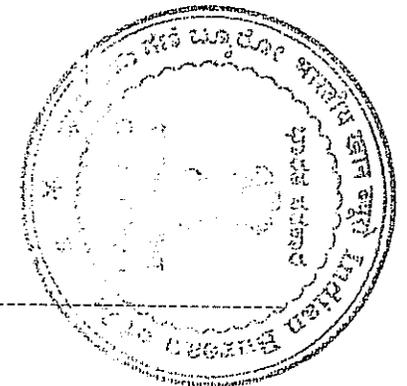
ANNEXURE-IVB/ 49

DEPTH (M) FROM TO	THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
15.00 16.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.89	0.62	2.55	
16.00 17.00	1.00	HEMATITIC ORE	GREY BROWN	65.84	0.72	2.55	
17.00 18.00	1.00	HEMATITIC ORE	GREY BROWN	61.90	0.92	3.05	
18.00 19.00	1.00	HEMATITIC ORE	GREY BROWN	62.40	1.48	3.57	
19.00 20.00	1.00	HEMATITIC ORE	REDDISH BROWN	65.64	0.90	2.54	
20.00 21.00	1.00	HEMATITIC ORE	REDDISH BROWN	66.45	1.36	2.04	
21.00 22.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.69	1.56	1.02	
22.00 23.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.59	0.30	1.02	
23.00 24.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.53	0.76	1.17	
24.00 25.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.57	0.58	1.33	
25.00 26.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.94	2.05	0.56	
26.00 27.00	1.00	HEMATITIC ORE	REDDISH BROWN	66.53	3.09	1.07	
27.00 28.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.57	1.50	0.76	
28.00 29.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.52	0.72	0.95	
29.00 30.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.54	0.72	0.70	
30.00 31.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.08	1.10	0.98	
31.00 32.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.74	0.32	1.23	
32.00 33.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.27	0.72	1.56	
33.00 34.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.97	0.54	1.53	



BOREHOLE NO:MKMR-15

DEPTH (M)		THICKNESS (M)	LITHOLOGY	COLOR DETAILS	Fe	SiO <sub>2</sub>	AL <sub>2</sub> O <sub>3</sub>	REMARKS
FROM	TO							
34.00	35.00	1.00	HEMATITIC ORE	GREY BROWN	61.60	2.62	6.88	
35.00	36.00	1.00	HEMATITIC ORE	GREY BROWN	67.58	0.52	1.02	
36.00	37.00	1.00	HEMATITIC ORE	GREY BROWN	67.17	1.58	1.53	
37.00	38.00	1.00	HEMATITIC ORE	GREY BROWN	68.77	0.46	1.17	
38.00	39.00	1.00	HEMATITIC ORE	GREY BROWN	68.70	0.46	1.17	
39.00	40.00	1.00	HEMATITIC ORE	REDDISH BROWN	62.10	1.54	4.33	
40.00	41.00	1.00	HEMATITIC ORE	REDDISH BROWN	67.55	1.04	1.02	
41.00	42.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.17	0.52	0.76	
42.00	43.00	1.00	HEMATITIC ORE	REDDISH BROWN	68.53	0.62	1.02	
43.00	44.00	1.00	BLUE DUST	BL GREY	69.07	0.50	0.56	
44.00	45.00	1.00	BLUE DUST	BL GREY	68.14	0.44	1.40	
45.00	46.00	1.00	BLUE DUST	BLACK	68.74	0.52	1.01	
46.00	47.00	1.00	BLUE DUST	BL GREY	69.03	0.54	0.68	
47.00	48.00	1.00	BLUE DUST	BL GREY	68.98	0.58	0.65	
48.00	49.00	1.00	BLUE DUST	BL GREY	68.53	0.88	1.08	
49.00	50.00	1.00	BLUE DUST	BL GREY	68.56	1.14	0.78	



**TABLE-4**  
**SECTION-WISE, BOREHOLE-WISE, CATEGORY-WISE ORE RESERVES BY CROSS SECTION METHOD**

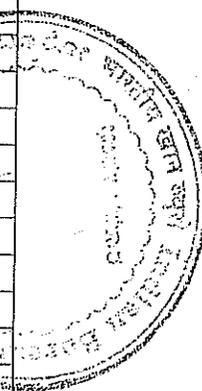
Section Number	Borehole Number	Intersection (m)		Diff (m)	True Width (m)	Average sectional Influence (m)	Area (Sq.m) (111)	Area (Sq.m) (112/121)	Reserves (Tonnes) (111)	Reserves (Tonnes) (112/121)	Total Reserves	Grade			
		From	To									Fe%	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	
S1-S1'	MKM-2	0.00	9.00	9.00	7.74	101	91.4119		35545.5173		35545.5173	50.11	7.29	10.80	
		36.00	40.50	4.50	3.87	101	363.0479		141171.1759		141171.1759	63.23	2.86	3.35	
	MKMR-4	0.00	17.00	17.00	14.72	101	2070.8043		805232.2521		805232.2521	49.67	16.00	7.25	
	MKMR-5	0.00	30.00	30.00	25.98	101	3489.2801		1356806.5669		1356806.5669	53.61	7.60	6.57	
	Influence(121)					101		2541.7207		988348.0942		988348.0942	53.61	7.60	6.57
	MKMR-7	0.00	94.00	94.00	80.84	101	8753.6317		3403849.6865		3403849.6865	62.35	5.37	2.57	
	Influence(121)					101		2429.2167		944600.9138		944600.9138	62.35	5.37	2.57
	MKM-1	0.00	43.00	43.00	36.98	101	5193.0211		2019306.2547		2019306.2547	53.83	6.59	8.70	
	Influence(121)					101		241.1628		93776.1548		93776.1548	53.83	6.59	8.70
Sub-Total :								7761911.4535		9788636.6162		57.34	7.01	5.28	
S2-S2'	MKMR-3	34.00	61.00	27.00	23.38	74	3201.7516	912.3723	912179.0308	259934.8683	1172113.8991	61.21	4.79	3.22	
	MKMR-6	0.00	85.00	85.00	73.10	74	7039.3837		2005520.4161		2005520.4161	63.47	3.34	2.54	
	MKMR-8	0.00	18.00	18.00	15.58	74	2764.2602		787537.7310		787537.7310	54.18	12.16	6.22	
	Influence(121)					74		2399.2355		683542.1940		683542.1940	54.18	12.16	6.22
	MKMR-12	0.00	11.00	11.00	9.46	74	915.0666	561.4323	260702.4743	159952.0623	420654.5366	49.21	13.21	11.24	
		28.00	54.00	26.00	22.36	74	2633.0998	1083.8567	750170.1330	308790.7738	1058960.9069	46.75	14.80	12.41	
		62.00	80.00	18.00	15.58	74	1785.3994	3031.9776	508660.2891	863810.4182	1372470.7073	43.96	16.71	14.71	
	Influence(121)					74	2947.0984	2976.0183	839628.3342	847867.6137	1687495.9478	43.96	16.71	14.71	
Sub-Total :								6064398.4085	3123897.9302	9188296.3388		52.62	11.16	8.80	

Section Number	Borehole Number	Intersection (m)		Diff (m)	True Width (m)	Average sectional Influence (m)	Area (Sq.m) (111)	Area (Sq.m) (112/121)	Reserves (Tonnes) (111)	Reserves (Tonnes) (112/121)	Total Reserves/ Resources	Grade			
		From	To									Fe%	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	
S3-S3'	MKMR-15	0.00	50.00	50.00	43.00	46	4960.1628	2549.0167	878444.8319	451430.8576	1329875.6895	64.83	1.52	2.80	
	Influence(121)					46	1554.3996	1802.3896	275284.1692	319203.1982	594487.3673	64.83	1.52	2.80	
	Sub-Total :								1153729.0010	770634.0557	1924363.0568	64.83	1.52	2.80	
S4-S4'	MKM-17	0.00	42.50	42.50	36.80	86	3241.7292		1073336.5381		1073336.5381	64.80	1.41	3.17	
	Influence(121)					86	2499.4681		827573.8879		827573.8879	64.80	1.41	3.17	
	MKM-11	14.00	60.00	46.00	39.56	86	4326.6545	3263.0238	1432555.3050	1080387.1802	2512942.4851	46.37	12.95	9.91	
	Influence(121)					86	1863.0233	1201.9432	616847.0146	397963.3935	1014810.4082	46.37	12.95	9.91	
	Sub-Total :								3950312.7456	1478350.5737	5428663.3193	52.82	8.91	7.55	
S5-S5'	MKMR-10	0.00	78.00	78.00	67.55	115	5167.3397		2277892.5233		2277892.5233	60.34	4.58	5.13	
	MKMR-9	7.00	53.00	46.00	39.56	115	4813.8024	1646.8635	2122044.4430	725978.6024	2848023.0454	52.21	4.79	8.79	
	Sub-Total :								4399936.9662	725978.6024	5125915.5686	55.82	4.70	7.16	
S6-S6'	MKM-16	11.00	18.00	7.00	6.02	102	461.4411		180319.6459		180319.6459	44.87	6.99	16.40	
	Sub-Total :								180319.6459		180319.6459	44.87	6.99	16.40	
	Total								23510608.2207	6098861.1620	31636194.5455	55.33	7.83	6.91	
<b>NET RESOURCES</b>												28472575.0910	55.33	7.83	6.91

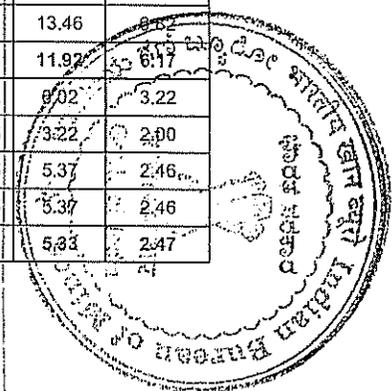


TABLE-5  
SECTIONWISE, BOREHOLEWISE, ORE TYPE WISE ORE RESERVES BY VERTICAL SECTION METHOD

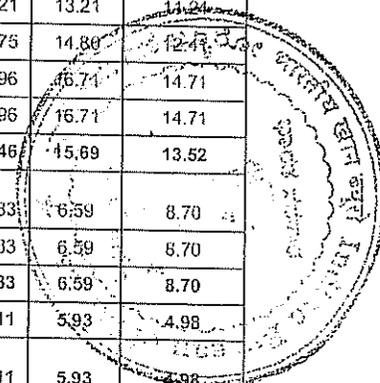
Section Number	Ore Type	Borehole Number	Intersection (m)		Thick. (m)	True Thick (m)	Average sectional influence (m)	Area (Sq.m) (111)	Area (Sq.m) (112)	Reserves (Tonnes) (111)	Reserves (Tonnes) (112/121)	Total Reserves (Tonnes)	Grade			
			From	To									Fe%	SiO2%	Al2O3%	
L-1	Haematitic Ore	MKM-2	0.00	9.00	9.00	7.74	52.00	614.5146		123025.8229		123025.8229	50.11	7.29	10.80	
	Haematitic Ore		36.00	40.50	4.50	3.87	52.00	253.8086		50812.4817		50812.4817	63.23	2.86	3.35	
	BH-TOTAL									173838.3046		173838.3046	53.94	6.00	8.62	
L-2	Haematitic Ore	MKMR-3	34.00	61.00	27.00	23.38	106.62	1952.3255		801404.2375		801404.2375	61.21	4.79	3.22	
	BH-TOTAL									801404.2375		801404.2375	61.21	4.79	3.22	
	Haematitic Ore	MKMR-4	0.00	17.00	17.00	14.72	106.62	1759.194	307.1788	722126.2675	126092.9041	848219.1716	49.67	16.00	7.25	
	BH-TOTAL									722126.2675	126092.9041	848219.1716	49.67	16.00	7.25	
L-3	Haematitic Ore	MKMR-15	0.00	43.00	43.00	37.24	105.00	2437.771		985468.9268		985468.9268	63.75	1.64	3.09	
	Blue Dust		43.00	50.00	7.00	6.06	94.00	314.3352		113757.9089		113757.9089	68.26	0.65	0.87	
	Influence						94.00		9614.1814		3479372.2487	3479372.2487	68.26	0.65	0.87	
	BH-TOTAL									1099226.8356	3479372.2487	4578599.0843	67.29	0.86	1.35	
	Haematitic Ore	MKMR-6	0.00	7.00	7.00	6.06	94.00	399.9662		144747.7678		144747.7678	59.84	2.21	3.51	
	Limonitic Ore		7.00	9.00	2.00	1.73	05.00	138.2252		55877.5371		55877.5371	61.45	0.80	2.46	
	Haematitic Ore		9.00	35.00	26.00	22.51	05.00	2140.3401		865232.4854		865232.4854	63.92	0.79	2.19	
	Blue Dust		35.00	42.00	7.00	6.06	05.00	413.355		167098.7588		167098.7588	67.90	0.46	1.33	
	Haematitic Ore		42.00	85.00	43.00	37.24	05.00	2969.1699	598.3053		241864.9175	241864.9175	62.29	5.60	2.75	
	Influence						05.00		300.253		121377.2753	121377.2753	62.29	5.60	2.75	
	BH-TOTAL										1232956.5491	363242.1928	1596198.7418	63.51	1.98	2.36
	Haematitic Ore	MKMR-5	0.00	28.00	28.00	24.24	05.00	2398.456		969575.8380		969575.8380	53.80	7.94	6.20	
	Limonitic Ore		28.00	30.00	2.00	1.73	05.00	270.0418		109164.3977		109164.3977	51.24	2.70	11.74	
Influence (121)						05.00		3444.342		1392375.2535	1392375.2535	54.88	6.16	6.69		
BH-TOTAL										1078740.236	1392375.254	2471115.489	54.30	6.71	6.72	

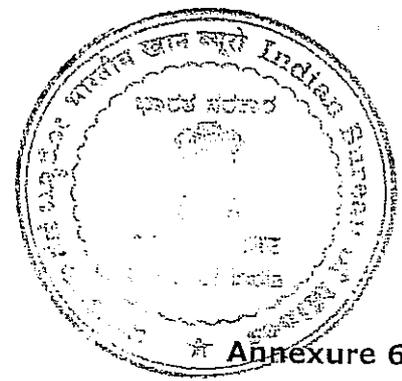


Section Number	Ore Type	Borehole Number	Intersection (m)		Thick. (m)	True Thick (m)	Average sectional Influence (m)	Area (Sq.m) (111)	Area (Sq.m) (112)	Reserves (Tonnes) (111)	Reserves (Tonnes) (112/121)	Total Reserves (Tonnes)	Grade		
			From	To									Fe%	SiO2%	Al2O3%
L-4	Haematitic Ore	MKMR-10	0.00	2.00	2.00	1.73	45.00	582.1067		100849.9858		100849.9858	65.45	1.16	1.26
	Blue Dust		2.00	7.00	5.00	4.33	90.90	154.5216	154.5216	54077.1517	54077.1517	108154.3035	67.04	1.75	0.88
	BD - Influence						32.50	154.5216	876.8807	19334.5152	109719.6976	129054.2128	67.04	1.75	0.88
	Haematitic Ore		7.00	23.00	16.00	13.85	90.90	850.4823	850.4813	297639.0381	297638.6882	595277.7263	64.93	10.99	3.16
	Shaly Ore		23.00	30.00	7.00	6.06	90.90	668.8305	339.5711	234067.2659	118838.0000	352905.2659	46.96	2.21	17.06
	Haematitic Ore		30.00	39.00	9.00	7.79	90.90	867.3639	429.8831	303547.0073	150444.0391	453991.0464	64.25	4.50	2.19
	Blue Dust		39.00	50.00	11.00	9.52	90.90	1057.3383	450.1214	370031.3982	157526.7358	527558.1339	65.98	1.94	1.60
	Haematitic Ore		50.00	78.00	28.00	24.24	90.90	2438.2581	1028.8050	853304.9960	360045.7418	1213350.7378	55.93	8.99	9.52
	Influence (121)						90.90	247.3236	91.9644	86554.6037	32184.3212	118738.9249	55.93	8.99	9.52
	BH-TOTAL									2319405.962	1280474.375	3599880.337	60.06	6.36	6.32
(Projection)	Haematitic Ore						64.50	1276.7816	154.5216	317056.7908	38371.5763	355428.3671	64.80	1.41	3.17
	Haematitic Ore	MKMR-17	0.00	42.50	42.50	36.80	90.90	3034.7561	154.5216	1062058.4185	54077.1517	1116135.5703	64.80	1.41	3.17
	Influence (121)						90.90	2712.6654	154.5216	949337.9467	54077.1517	1003415.0985	64.80	1.41	3.17
	BH-TOTAL									2328453.1561	146525.8798	2474979.0359	64.80	1.41	3.17
	Blue Dust	MKMR-8	0.00	2.00	2.00	1.73	90.90	256.9881		89936.8404		39936.8404	66.60	0.67	1.41
	Haematitic Ore		2.00	18.00	16.00	13.85	90.90	1882.0276		658643.7890		658643.7890	52.63	13.46	
	BH-TOTAL									748580.6295		748580.6295	54.31	11.92	6.17
	Haematitic Ore	MKMR-7	0.00	10.00	10.00	8.66	90.90	603.0733	68.0869	211054.5474	23828.0320	234882.5794	60.22	3.02	3.22
	Blue Dust		10.00	15.00	5.00	4.33	90.90	429.8427	185.4405	150429.9005	64897.6846	215327.5851	65.35	3.22	2.90
	Haematitic Ore		15.00	94.00	79.00	68.41	90.90	6625.7134	11407.7110	2318767.7900	3992299.5801	6311067.3701	62.05	5.37	2.46
	Influence (121)						90.90	2073.1013	2626.5901	725512.8965	919214.6043	1644727.5008	62.05	5.37	2.46
BH-TOTAL									3405765.1344	5000239.9010	8406005.0354	62.08	5.37	2.47	



Section Number	Ore Type	Borehole Number	Intersection (m)		Thick. (m)	True Thick (m)	Average sectional Influence (m)	Area (Sq.m) (111)	Area (Sq.m) (112)	Reserves (Tonnes) (111)	Reserves (Tonnes) (112/121)	Total Reserves (Tonnes)	Grade		
			From	To									Fe%	SiO2%	Al2O3%
L-5	Shaly Ore	MKM-16	11.00	18.00	7.00	6.02	66.50	941.9099		241152.4821		241152.4821	44.87	6.99	16.40
	BH-TOTAL									241152.4821		241152.4821	44.87	6.99	16.40
L-5	Haematitic Ore	MKMR-9	7.00	53.00	46.00	39.83	66.50	4137.084		1059196.9311		1059196.9311	52.21	4.79	8.79
	Influence (121)						66.50		232.7956		59601.4935	59601.4935	52.21	4.79	8.79
	BH-TOTAL									1059196.9311	59601.4935	1118798.4246	52.21	4.79	8.79
	Haematitic Ore	MKMR-11	14.00	60.00	46.00	39.56	66.50	4861.3233		1244620.2979		1244620.2979	46.37	12.95	9.91
	Influence (121)						66.50		1857.7488		475630.1365	475630.1365	46.37	12.95	9.91
	BH-TOTAL									1244620.2979	475630.1365	1720250.4344	46.37	12.95	9.91
(Projection)	Haematitic Ore	MKMR-12	0.00	11.00	11.00	9.46	18.00	1509.5146		104609.3618		104609.3618	49.21	13.21	14.24
	Haem+Silic.Ore		28.00	54.00	26.00	22.36	66.50	2951.4784	191.9801	755652.2574	49151.7051	804803.9625	46.75	14.80	14.71
	Haem+Silic.Ore		62.00	80.00	18.00	15.58	66.50	1748.5051		447661.0182		447661.0182	43.96	16.71	14.71
	Influence (121)						66.50		1994.3442		510601.9738	510601.9738	43.96	16.71	14.71
	BH-TOTAL									1307922.6374	559753.6799	1867676.3163	45.46	15.69	13.52
(Projection)	Haem+S.Lamin.						18.00	1419.4302		98366.5129		98366.5129	53.83	6.59	8.70
	Haematitic Ore	MKM-1	0.00	43.00	43.00	36.98	66.50	3736.0077		956511.3714		956511.3714	53.83	6.59	8.70
	BH-TOTAL									1054877.8843		1054877.8843	53.83	6.59	8.70
	TOTAL :									18818267.5445	12883308.0641	31701575.6086	59.11	5.93	4.98
	NET RESOURCES											28531418.0478	59.11	5.93	4.98





**THE FEASIBILITY REPORT OF MINING OPERATION AT  
SWAMIMALAI IRON ORE MINING BLOCK  
(ML NO 2559) IS FURNISHED AS UNDER**

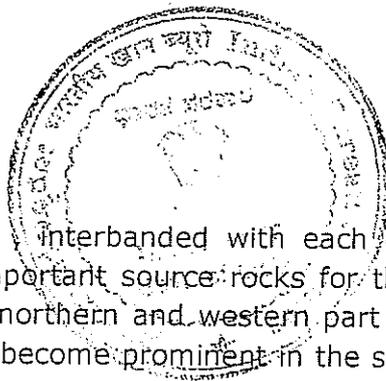
**1. GENERAL MINE DESCRIPTION:**

Swamimalai Iron ore Mining Block (ML No 2559) with an area of 26.71 Ha (as per CEC survey) is falls in Survey of India toposheet No D43E8 (57 A/8), D43K5 (57 B/5) AND D43K9 (57B/9), co-ordinates of the ML boundary is given below.

ML corner boundary point	INDIAN BANGLADESH		WGS 84	
	Latitude	Longitude	Latitude	Longitude
LBS-A	N 15° 00' 59.6"	E 76° 33' 46.6"	N15° 01' 04.1 "	E 76° 33' 42.9"
LBS-C	N 15° 00' 38.7"	E 76° 33' 42.4"	N15° 00' 43.2 "	E 76° 33' 38.7"
LBS-D	N 15° 00' 58.0"	E 76° 33' 44.0"	N15° 01' 02.5 "	E 76° 33' 40.3"
LBS-E	N 15° 00' 57.9"	E 76° 33' 41.4"	N15° 01' 02.4 "	E 76° 33' 37.7"
LBS-F	N 15° 00' 54.6"	E 76° 33' 34.0"	N15° 00' 59.1 "	E 76° 33' 30.3"
LBS-G	N 15° 00' 55.1"	E 76° 33' 31.2"	N15° 00' 59.6 "	E 76° 33' 27.5"
LBS-H	N 15° 00' 56.4"	E 76° 33' 27.0"	N15° 01' 00'.9"	E 76° 33' 23.3"
LBS-I	N 15° 00' 55.9"	E 76° 33' 25.2"	N15° 01' 00'.4"	E 76° 33' 21.5"
LBS-J	N 15° 00' 56.0"	E 76° 33' 22.7"	N15° 01' 00'.5"	E 76° 33' 19.0"
LBS-K	N 15° 00' 56.8"	E 76° 33' 18.4"	N15° 01' 01'.3"	E 76° 33' 14.7"
LBS-L	N 15° 00' 55.9"	E 76° 33' 16.1"	N15° 01' 00'.4"	E 76° 33' 12.4"
LBS-M	N 15° 00' 53.7"	E 76° 33' 16.8"	N15° 00' 58.2 "	E 76° 33' 13.1"

**Regional Geology :**

The Ballari-Hospet region forms a part of the 'Sandur Schist Belt' referable as the "Dharwar" a group of Precambrian schistose rocks of Mysore. The lithological units include green stones which are the metamorphosed into basic igneous rocks occupying the valley regions, with phyllite-quartzites forming the canoe-shaped amphitheatre of hill, trending NNW-SSE and enclosing Sandur. The phyllites are locally shale and the quartzites are of the nature of banded hematite jaspers (BHJ), and banded hematite



quartzites (BHQ) interbanded with each other. The banded hematite quartzites, the important source rocks for the iron ores in the area are prominent in the northern and western part of the ranges, where as the associated shales become prominent in the southern and eastern parts of the area. The iron ores 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, the dips are often steep being vertical in a number of places posing dips towards NE and SW are found as in the Ramandurg and NEB ranges respectively.

The general sequences of rock formations found in the area are as given below:

Soil Cover

Laterite/ Lateritised ore

Banded Ferruginous Quartzite/Jasper

Ferruginous shale and Phyllite and

Iron ore formation

The Ballari-Hosapete region covers part of the highly folded and metamorphosed Dharwarian formations (Archean) of the Karnataka State. The hill ranges and contained valleys in the region constitute the "Sandur Synclinorium" with aerial trend of NW-SE to NNW-SSE. The strata have been tightly folded into isoclinal anticlines and synclines in the synclinorium. The weathering and denudation cycles have subsequently carved out valleys in the anticlines and hills in the syncline. The iron ore deposits of Ballari-Hosapete constitute part of Ramanadurg range of the "Sandur Synclinorium". The ore bearing localities, south of Ballari-Hosapete railway line comprises of Ramanadurg, Kumaraswamy, Donimalai, Thimmappanagudi and Devadarigudda sections along the eastern and western regions of the Sandur hills.

#### **Geology of the Mining Block:**

The rock formations belong to the iron ore stage of Dharwar system. The general sequence of rock formations found in the area is as given below:



Laterite / Soil

Iron Ore (Hematite)

BHQ

Shale / Fer. Clay

Laterite / Soil: The Laterite / Soil is well exposed in the area at higher altitude. The thickness of the ferruginous laterite varies from 2 to 12, at locations as observed in the mine working pits. Ferruginous laterite observed in the area is highly porous, reddish to dull red in colour. Pebbles, boulders of ferruginous matrix are embedded in the laterite.

Iron Ore Formation: The iron formation/deposit of Swamimalaj mine lease area is part of Kumaraswamy Range and it is known for its best quality. The above formation is covered by thick mantle of ferruginous laterites and banded haematite quartzite at locations. The iron ore deposit occurs in the area, in the form of reef, with Banded Ferruginous Quartzite. The strike of the iron ore is N 45° W to S 45° E to N 50° W to S 50° E with dip of 60° to 65° north east. Average strike length of ore body is 524 m is exposed. Average thickness is 36 m and depth is around 40 m. The iron ore formation occurs in the area is banded and powdery in nature, reddish brown in colour and hard metallic luster. Ore in the form of lumps and powder is also observed at some places. The quality of iron ore is good with the grade ranging from 45% to 67% Fe content.

Banded Ferruginous Quartzite (BHQ): The banded ferruginous quartzite is exposed in the area of ML block in the form of discontinuous bands at places along the hill slopes. The banded ferruginous quartzite have exposed in patches over the iron ore formation. The BHQ in the area is considered as waste due to low Fe content and exhibit, fine grained, cherry red in colour and has metallic luster.

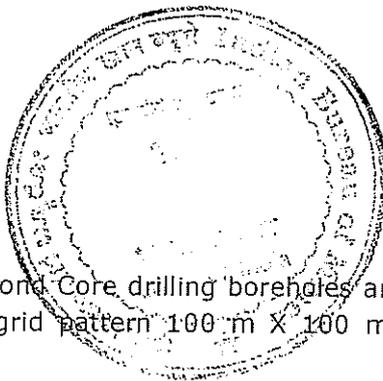
Shale / Fer. Clay: Shale are exposed as wall rocks at places and also exposed within the iron ore formation, as intercalated waste. It is light yellow to light pinkish red in colour.

## **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 204.5 m (4 Bhs) and 796.0 m (13 Bhs). Total 1000.5 m (17 Bhs), 985 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
2014-15 (20.08.2014 to 30.10.2014)	04	13	204.5	796.0	17	1000.5

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

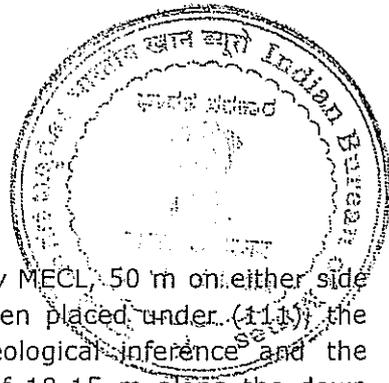
### **3. RESERVE ASSESSMENT:**

1) Geological & Net Geological Reserve have been estimated by MECL, bulk density of 3.85 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 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 Tones)

UNFC Code	Geological Reserves (MECL)	Net Geological Reserves (90% Geological Reserves by MECL)	Mineable (Reserves with the bulk density of 3.0 t/Cu.m and 95% recovery) by ICFRE
111	23510608	21159547	
121/122	8125586	7313027	
Total	31636194	28472574	23184811
Grade		Wt. Avg. 55.33%	



Based on the detailed exploration data conducted by MECL, 50 m on either side of the iron ore intersection of the borehole has been placed under (111) the next 50 m under (122). However, based on geological inference and the behavior of the iron ore formations an influence of 10-15 m along the down depth has been estimated and placed under (121) category of UNFC.

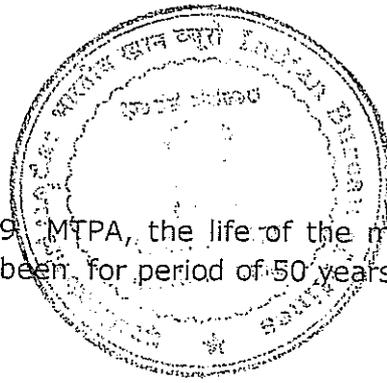
3) Based on the MECL data MSPL Limited has been reclassified the estimated of reserves by considering the MECL sections the area where the bore holes are drilled at 100 m interval, the reserves are categorized as proved reserves (111) to the lowest depth, beyond that lowest depth the reserves are categorized as probable reserves (121 & 122). Some reserves are beyond ultimate pit limit and are categorized as measured mineral resources (211). The reserves / resources calculation by cross section method, category wise are reclassified as on 01-10-2017 (under UNFC Category).

	UNFC Code	Quantity in million tons	Grade %Fe
<b>A. Total Mineral Reserve</b>			
Proved Mineral Reserve	111	16.36	55.33
Probable Mineral Reserve	121 and 122	8.54	
<b>Sub Total</b>		<b>24.90</b>	
<b>B. Total Remaining Resources</b>			
Feasibility Mineral Resource	211	4.51	55.33
Prefeasibility Mineral Resource	221 and 222	-	
Measured Mineral Resource	331	-	
Indicated Mineral Resource	332	-	
Inferred Mineral Resource	333	-	
Reconnaissance Mineral Resource	334	-	
<b>Sub Total</b>		<b>4.51</b>	
Total Reserve (111,121,&122)+ Resources (211)		<b>29.41</b>	

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.

#### **4. PRODUCTION SCHEDULE:**

The updated category wise reserves and resources as on 01-10-2017 is 24.90 MMT and 4.51 MMT respectively. However at the present rate of



production capacity 0.319 MTPA, the life of the mine will be 78 years. Where as LOI issued has been for period of 50 years.

#### **5. MINING METHOD:**

The existing geometry of the benches are irregular, it is proposed to maintain the height of the bench is 9 m and width of bench will be 9 - 10 m with road gradient maintained at 1:16. Pit slope angle will be at 40° to 55° and bench slope angle will be 85°. 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 mRL is 985 and maximum mRL is 1046, 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 667200 to 667900 N 1660300 to 1660900 for five year plan period.

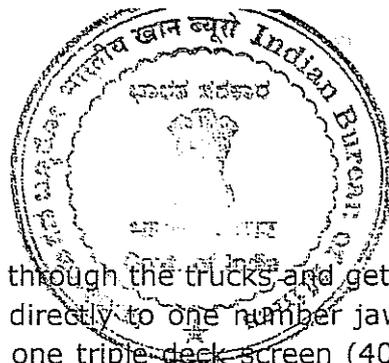
Swamimalai Iron Ore Mine is being operated by open cast mining method with high mechanization comprising of hydraulic excavators and dumpers combinations. There is no change in proposal method of excavation.

For the conceptual period it is proposed to exhaust in section S3 to S6 then back filling will be taken place to reclaim the mined out area, ultimately the height and width of the benches are about 9 m & 6m, with haul road width more than 10 m with gradient maintained at 1:16. Pit slope angle is maintained at 40° to 55° and bench slopes are 85°. To win the blocked ore 4.51 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 1:0.49. 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 be utilised for the dispatch of products from stock piles/Crushers.

There is no beneficiation process at mine site.

#### **7. MARKETING:**

The total ROM ore produced from this mine will be crushed and screened, the ore has been dispatched to MSPL Pellet Plant for its captive use. Physical specification of ore is 100% -10 mm, the chemical composition Wt. Avg. 55% to 58% Fe. The present sale price for calibrated Rs. 1897/- per ton and for fines Rs.1132/- per ton on the basis of information of IBM for the month of July 2017.

#### **8. INFRASTRUCTURE:**

The mining lease is located in Kumarswamy Forest Range near Swamimalai (Karthikeshwara) village of Sandur Taluk, Ballari District, Karnataka.

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 Swamimalai Iron ore mining block for mining and related operations is 90 (Highly Skilled - 25, Skilled-20, Semi-Skilled -15, Un-Skilled- 10) and 20 statutory requirement.

#### **9. ENVIRONMENTAL REQUIREMENTS:**

The mining block has environmental clearance. The Mining Plan (including

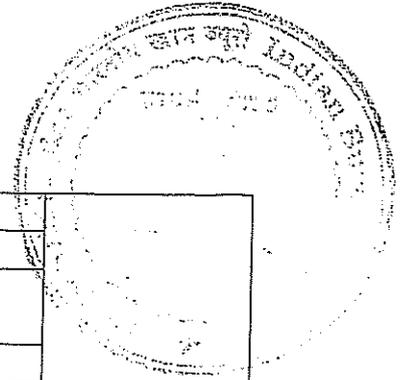
Progressive mine closure plan) to be obtained from Indian Bureau of Mines, Bengaluru, and consent for operation from SPCB. The final mine closure plan will be submitted at the time of final closure. The reclamation and rehabilitation plans were prepared by ICFRE and approved by CEC. The annual capacity of the production is 0.319 MTPA fixed by CEC.

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

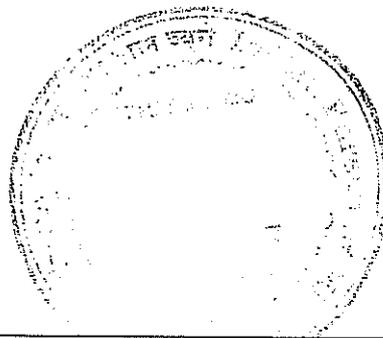
Nil.

**11. ECONOMIC EVALUATION:**

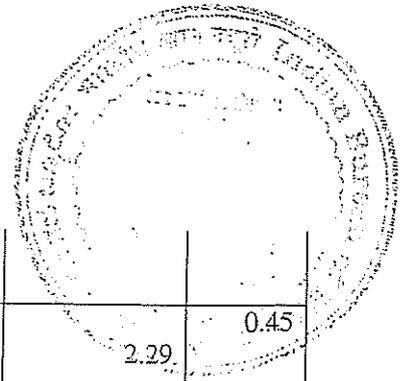
Budget for Proposed Mining				
Activities	Areas of investment	Method of Calculation	Basics	Expenses (In Lakh Rs.)
Capital Investment				2120.94
I	<b>Land</b>			214.48
a	Land cost expenditure	Rs 8.03 Lakh / Ha. For forest land	Area: 26.71 Ha. Forest land	214.48
b	Cost on relief and rehabilitation action 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.	<b>Mining</b>			1768.00
a.	Cost of Infrastructure & equipments		Mechanized mining	1768.00
III.	<b>Environmental protection</b>			83.46
a.	Pollution Control ( check dam, gully plug, settling tanks, water tanker, etc.)			
	Garland Drain			83.46
	Retaining			



	Walls			
	Settling ponds			
	Plantation, Terrecing			
	Water Tanker			
	Bund with stone boulders			
	Masonry check dam			
	Gully plugs			
	Reclaming area under encroachment			
IV.	<b>Socio-economic development</b>			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.	Incòme Generation Activities	Financial support for interest free loans	Financial Support to SHG	20
V.	<b>Occupational Health &amp; Safety</b>			5
a.	Infrastructure & PPEs			5
VI	<b>Payment to Govenment-Auction Charges</b>			3617.51
a	Payments regarding Exploration,DGPS survey & RR preparation,etc			293.34
b	Upfront Paymnet including all installments			3324.17
	<b>Total Capital Investment</b>			5738.45
			Say Rs. 5738 lakhs	

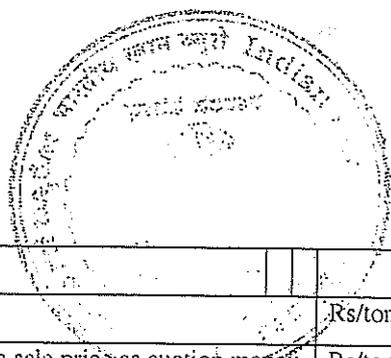


Budget for Proposed Mining					
Activities	Areas of investment	Method of Calculation	Basics	Expenses (In Lakh Rs.)	Cost per tonne in Rs.
Recurring Expenditure				2,298.00	450.59
i	<b>Mining</b>				
a.	Expenditure for infrastructure and equipment maintenance		15 % of direct investment for infrastructure & maintenance	265.20	52.00
b.	Mining of ore and waste	Rs. Per ton	Rs. 270 / ton	861.30	168.88
c.	Salaries & Wages of 90 staffs	No of workers X Wages	Rs. 1,40,777/- per Annum	126.70	24.84
d.	Royalty on mineral & miscellaneous	Rs. Per ton	Royalty 15% on Sale Price, NMET -2% on Royalty	552.50	108.33
ii.	<b>Socio-economic development -SPV- 10 % on sale price /DMF-10 % on royalty</b>			415.27	81.43
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.	<b>Occupational Health &amp; Safety</b>				0.00
a.	For routine checkup	90 persons X per annum	Budget Rs.2000/- per annum per	1.8	0.35

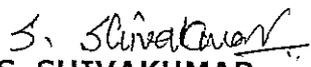


			employee		
b.	Medical aid as under ESI scheme		Rs.2544/- per annum per employee	2.29	0.45
c.	Budget for training		per year	10.00	1.96
d.	Compensation for accident and injuries	Rs. 100,000 X Anticipated rate of injuries ( No of workers)	Anticipated rate of Injury : 1%	0.90	0.18
iv.	<b>Environment Management</b>				0.00
a.	Maintenance of Pollution control Facilities		30 % Capital Investment	25.04	4.91
b.	Dust Suppression & Pollution Control			12.00	2.35
c.	Environmental Monitoring			15.00	2.94
d.	Environmental division			10.00	1.96
	<b>Total Recurring Expenditure</b>			2,298.00	450.59
				Say Rs. 450 /-	

Capital investment including Pre -emptive expenses:	2120.94	Lakhs
Capital investment for Mining and Environmental Management: (Environmental controle.social development etc)	1906.46	Lakhs
Consideration of per tonne Working cost as on date is given below		
Recurring cost (Rs/MT)		Rs/tonne
Expenditure on cost of Mining	354.06	
Expenditure for Socio-economic development	81.43	
Expenditure for Occupational Health and safety	2.94	
Expenditure for Environmental Management	12.16	



Total			450.59	
Value of Mineral at pit head		Rs/tonne	1132.00	
Lessee has to pay 111.10% on sale price as auction money		Rs/tonne	1257.652	
<b>Summary of Viability:</b>				
Expenditure calculated at Working cost Rs 450.59/- per tonne and Revenue at Rs 1132 /-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, July '2017 data				
2. 55% to 58% fe lumps cost- Rs 1897/- per tonne				1897
3. 55% to 58% fe Fines cost-Rs 1132/- per tonne				1132
4. Considered dispatch of 100% fines for our captive plant				

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

**SWAMIMALAI IRON ORE MINES OF MSPL LIMITED**  
(ERSTWHILE OF M/s. KARTIKEYAS MANGANESE & IRON ORES PVT.LTD., (ML.No.2559)

ESTIMATION OF RESERVES / RESOURCES AS ON 01-10-2017 ( AS PER MECL BULK DENSITY 3.50 T/M<sup>3</sup> AND 90% OF GEOLOGICAL RESERVES)

SECTION	AREA ( Sq.m)				INFLU	VOLUME ( Cu.m)				TONNAGE (Bulk Density-3.50 Cu.m)					
	111	122	121	211		111	122	121	211	111	122	121	211	TOTAL	
S-1	19116	1054	5213	807	100	1911600	105400	521300	80700	7359660	405790	2007005	310695	10083150	
S-2	18239	1169	5161	3796	74	1201688	86506	381914	280904	4625491	333048	1470369	1081480	7511389	
S-3	6946	6740	6376	4211	53	368138	357220	337928	223183	1417331	1375297	1301023	859255	4952906	
S-4	6548	2345	3119	4383	58	379784	136010	180902	254214	1462168	523639	996473	978724	3661004	
S-4A	5764	2114	1825	3660	56	322784	118384	102200	204960	1242718	455778	393470	789096	2881063	
S-5	5949	1594	0	2832	86	511614	137084	0	249552	1969714	527773	0	937675	3435163	
S-6	270	0	0	132	100	27000	0	0	13200	103950	0	0	50820	154770	
S-7	0	0	0	0	83	0	0	0	0	0	0	0	0	0	
TOTAL						5194867	1039664	1676668	1430787	16182033	3621325	5868339	5007745	32679443	
										90 % Recovery	16363830	3259193	5281505	4506971	29411499

SECTION	IN MILLION TONS					GRADE %			
	111	122	121	RESERVES (111, 122 & 121)	RESOURCES (211)	GRAND TOTAL	Fe	SiO2	Al2O3
S-1	7.36	0.41	2.01	9.77	0.31	10.08	57.34	7.01	5.28
S-2	4.63	0.33	1.47	6.43	1.08	7.51	52.82	11.16	8.80
	1.42	1.38	1.30	4.09	0.86	4.95	57.70	6.35	6.20
	1.46	0.52	0.70	2.68	0.99	3.66	52.32	8.91	7.55
	1.24	0.46	0.39	2.09	0.79	2.88	54.32	6.81	7.36
	1.97	0.53	0.00	2.50	0.94	3.44	55.82	4.70	7.18
S-6	0.10	0.00	0.00	0.10	0.05	0.15	44.87	6.99	16.40
S-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	18.18	3.62	5.87	27.67	5.01	32.68			
90 % Recovery	16.36	3.25	5.28	24.90	4.51	29.41	55.32	7.82	6.92

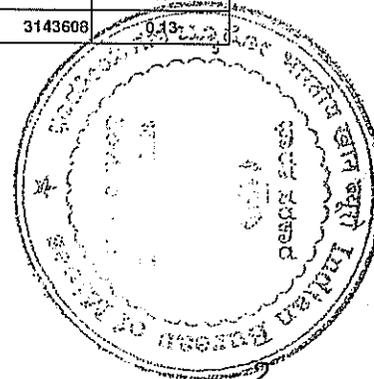
RESERVES / RESOURCES		
UNFC CODE	In Tons	In Million Tons
111	16363830	16.36
121 & 122	8540698	8.54
<b>TOTAL</b>	<b>24904528</b>	<b>24.90</b>
211	4506971	4.51
<b>GRAND TOTAL</b>	<b>29411499</b>	<b>29.41</b>

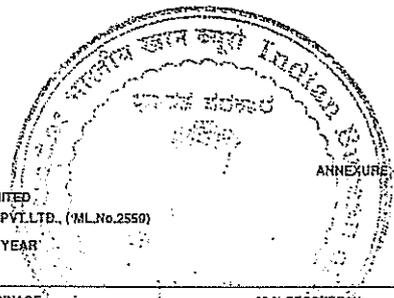
**SWAMIMALAI IRON ORE MINES OF MSPL LIMITED**  
**(ERSTWHILE OF M/s. KARTIKEYAS MANGANESE & IRON ORES PVT.LTD., ( ML.No.2559)**  
**ESTIMATION OF WASTE**

SECTION	AREA				INFLU	VOLUME				TONNAGE (Bulk Density- 2.00 t/Cu.m)					TOTAL
	SHALE	LAT / SOIL / CLAY	DUMP	BHQ		SHALE	LAT / SOIL / CLAY	DUMP	BHQ	SHALE	LAT / SOIL / CLAY	DUMP	BHQ	10 % waste intercalated waste	
S-1	2858	2250	1778	0	100	285800	225000	177800	0	571600	450000	355800	0	977246	2354446
S-2	5562	0	0	2133	74	411588	0	0	157842	829176	0	0	315684	642991	1781851
S-3	3113	3940	0	962	53	164989	208820	0	50986	329978	417640	0	101972	409365	1258955
S-4	3149	145	0	1450	58	182642	8410	0	84100	365284	16820	0	168200	268228	818532
S-4A	3961	0	0	0	56	221816	0	0	0	443632	0	0	0	209197	652829
S-5	1985	10	0	0	86	170710	860	0	0	341420	1720	0	0	249749	592889
S-6	0	735	0	0	100	0	73500	0	0	0	147000	0	0	10395	157395
S-7	0	0	0	0	83	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>20628</b>	<b>7080</b>	<b>1778</b>	<b>4545</b>	<b>610</b>	<b>1437545</b>	<b>516590</b>	<b>177800</b>	<b>292926</b>	<b>2875090</b>	<b>1033180</b>	<b>355600</b>	<b>585856</b>	<b>2767170</b>	<b>7616896</b>

SUMMARY			
PARTICULAR	ORE	DEVELOPMENT	RATIO
TONNAGE	24904528	7616896	0.31
VOLUMETRIC	6468709	3143608	0.49
TONS / CU.M	24904528	3143608	0.13





SWAMIMALAI IRON ORE MINES OF MSPL LIMITED  
(ERSTWHILE OF M/s. KARTIKEYAS MANGANESE & IRON ORES PVT.LTD., (ML.No.2550)  
DEVELOPMENT & PRODUCTION FOR THE 1st YEAR

ANNEEXURE - 8 (A)

PRODUCTION

SECTION	AREA (Sq.m)		INFLU	VOLUME ( Cu.m)			TONNAGE		90 % RECOVERY			
	111	122		111	122	TOTAL	111	122	TOTAL	111	122	TOTAL
S-3	312	0	53	16536	0	16536	63664	0	63664	57297	0	57297
S-4	262	0	58	15196	0	15196	58505	0	58505	52654	0	52654
S-4A	147	0	56	9232	0	9232	31693	0	31693	28524	0	28524
S-5	292	0	86	25112	0	25112	96681	0	96681	87013	0	87013
S-6	270	0	100	27000	0	27000	103950	0	103950	93555	0	93555
TOTAL	1283	0	353	92076	0	92076	354493	0	354493	319043	0	319043

DEVELOPMENT

SECTION	AREA		INFLU	VOLUME			TOTAL	TONNAGE			TOTAL
	SHALE / FER.CLAY	LAT / SOIL / CLAY		SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated		SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	
S-3	113	0	53	5989	0	1654	7643	11978	0	6366	16944
S-4	225	33	58	13050	1914	1520	16484	26100	3828	5850	25778
S-4A	222	0	56	12432	0	823	13255	24864	0	3169	28033
S-5	23	0	86	1978	0	2511	4489	3956	0	9666	13624
S-6	0	370	100	0	37000	2700	39700	0	74000	10395	84395
TOTAL	583	403	353	33449	38914	9208	81571	66898	77828	35440	180175

SUMMARY			
PARTICULAR	ORE	DEVELOPMENT	RATIO
TONNAGE	319043	180175	0.56
VOLUMENTRIC	82868	81571	0.98
TONS / CU.M	319043	81571	0.25

SWAMIMALAI IRON ORE MINES OF MSPL LIMITED  
(ERSTWHILE OF M/s. KARTIKEYAS MANGANESE & IRON ORES PVT.LTD., ( ML.No.2558)  
DEVELOPMENT & PRODUCTION FOR THE II nd YEAR



PRODUCTION

SECTION	AREA ( Sq.m)		INFLU	VOLUME ( Cu.m)			TONNAGE			90 % RECOVERAY		
	111	122		111	122	TOTAL	111	122	TOTAL	111	122	TOTAL
S-3	273	27	53	14469	1431	15900	55706	5509	61215	50135	4958	55094
S-4	289	0	58	17342	0	17342	66767	0	66767	60090	0	60090
S-4A	395	0	56	22120	0	22120	85162	0	85162	76646	0	76646
S-5	427	0	86	36722	0	36722	141380	0	141380	127242	0	127242
S-6	0	0	100	0	0	0	0	0	0	0	0	0
TOTAL	1394	27	353	90653	1431	92084	349014	5509	354523	314113	4958	319071

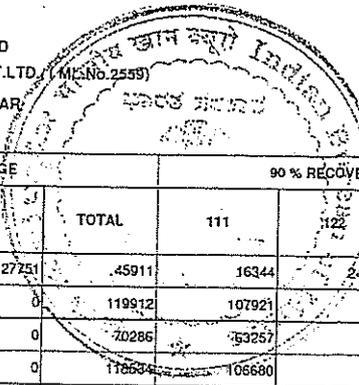
DEVELOPMENT

SECTION	AREA		INFLU	VOLUME				TONNAGE			TOTAL
	SHALE / FER.CLAY	LAT / SOIL / CLAY		SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	TOTAL	SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	
S-3	59	0	53	3127	0	1590	4717	6254	0	6122	12376
S-4	119	0	58	6902	0	1734	8636	13804	0	6677	20481
S-4A	216	0	56	12096	0	2212	14308	24192	0	8516	32708
S-5	30	3	86	2580	258	3672	8510	5160	516	14138	19814
S-6	0	365	100	0	35500	0	36500	0	73000	0	73000
TOTAL	424	368	353	24705	36758	9208	70671	49410	73516	35452	158378

SUMMARY			
PARTICULAR	ORE	DEVELOPMENT	RATIO
TONNAGE	319071	158378	0.50
VOLUMETRIC	82876	70671	0.85
TONS / CU.M	319071	70671	0.22

SWAMIMALAI IRON ORE MINES OF MSPL LIMITED  
(ERSTWHILE OF M/s. KARTIKEYAS MANGANESE & IRON ORES PVT.LTD.)

DEVELOPMENT & PRODUCTION FOR THE III rd YEAR



## PRODUCTION

SECTION	AREA ( Sq.m)		INFLU	VOLUME ( Cu.m)			TONNAGE			90 % RECOVERY		
	111	122		111	122	TOTAL	111	122	TOTAL	111	122	TOTAL
S-3	89	136	53	4717	7208	11925	18160	27251	45911	16344	24976	41320
S-4	537	0	58	31146	0	31146	119912	0	119912	107921	0	107921
S-4A	325	0	56	18256	0	18256	70286	0	70286	63257	0	63257
S-5	358	0	86	30788	0	30788	118534	0	118534	106680	0	106680
S-6	0	0	100	0	0	0	0	0	0	0	0	0
TOTAL	1310	136	353	84907	7208	92115	326892	27751	354643	294203	24976	319178

## DEVELOPMENT

SECTION	AREA		INFLU	VOLUME				TONNAGE			TOTAL
	SHALE / FER.CLAY	LAT / SOIL / CLAY		SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	TOTAL	SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	
S-3	204	147	53	10812	7791	1193	19796	21624	15582	4591	41797
S-4	195	0	58	11310	0	3115	14425	22620	0	11991	34611
S-4A	221	0	56	12376	0	1826	14202	24752	0	7029	31781
S-5	82	7	86	7052	602	3079	10733	14104	1204	11853	27161
S-6	0	0	100	0	0	0	0	0	0	0	0
TOTAL	702	154	353	41550	8393	9212	59155	83100	16766	35464	135350

SUMMARY			
PARTICULAR	ORE	DEVELOPMENT	RATIO
TONNAGE	319178	135350	0.42
VOLUMETRIC	82904	59155	0.71
TONS / CU.M	319178	59155	0.19

SWAMIMALAI IRON ORE MINES OF MSPU LIMITED  
(ERSTWHILE OF M/s. KARTIKEYAS MANGANESE & IRON ORES PVT.LTD., ( ML.No.2559)

## DEVELOPMENT &amp; PRODUCTION FOR THE YEAR

## PRODUCTION

SECTION	AREA ( Sq.m)		INFLU	VOLUME ( Cu.m)			TONNAGE			90% RECOVERY		
	111	122		111	122	TOTAL	111	122	TOTAL	111	122	TOTAL
S-3	283	0	53	14999	0	14999	57746	0	57746	51972	0	51972
S-4	445	0	58	25810	0	25810	99369	0	99369	89432	0	89432
S-4A	450	0	56	25200	0	25200	97020	0	97020	87318	0	87318
S-5	303	0	85	26058	0	26058	100323	0	100323	90291	0	90291
S-6	0	0	100	0	0	0	0	0	0	0	0	0
TOTAL	1481	0	353	92067	0	92067	354458	0	354458	319012	0	319012

## DEVELOPMENT

SECTION	AREA		INFLU	VOLUME				TONNAGE			TOTAL
	SHALE / FER.CLAY	LAT / SOIL / CLAY		SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	TOTAL	SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	
S-3	115	59	53	6095	3127	1500	10722	12190	6254	5775	24219
S-4	224	0	58	12992	0	2581	15573	25984	0	9937	35921
S-4A	226	0	56	12556	0	2520	15176	25312	0	9702	35014
S-5	166	0	85	14276	0	2605	16882	28552	0	10032	38584
S-6	0	0	100	0	0	0	0	0	0	0	0
TOTAL	731	59	353	46019	3127	9207	58353	92038	6254	35446	133738

## SUMMARY

PARTICULAR	ORE	DEVELOPMENT	RATIO
TONNAGE	319012	133738	0.42
VOLUMETRIC	82860	58353	0.70
TONS / CU.M	319012	58353	0.18

SWAMIMALAI IRON ORE MINES OF MSPL LIMITED  
(ERSTWHILE OF M/s. KARTIKEYAS MANGANESE & IRON ORES PVT.LTD., ( M.L.No.2559)  
DEVELOPMENT & PRODUCTION FOR THE V th YEAR

ANNEXURE - 8(E)

PRODUCTION

SECTION	AREA ( Sq.m)		INFLU	VOLUME ( Cu.m)			TONNAGE			90 % RECOVERY		
	111	122		111	122	TOTAL	111	122	TOTAL	111	122	TOTAL
S-3	250	102	53	13250	5406	18656	51013	20813	71826	45911	18732	64643
S-4	520	0	58	30160	0	30160	116116	0	116116	104504	0	104504
S-4A	312	0	56	17472	0	17472	67267	0	67267	60540	0	60540
S-5	300	0	86	25800	0	25800	99330	0	99330	89397	0	89397
S-6	0	0	100	0	0	0	0	0	0	0	0	0
TOTAL	1382	102	353	86682	5406	92088	333726	20813	354539	300353	18732	319085

DEVELOPMENT

SECTION	AREA		INFLU	VOLUME				TONNAGE			TOTAL
	SHALE / FER.CLAY	LAT / SOIL / CLAY		SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	TOTAL	SHALE / FER.CLAY	LAT / SOIL / CLAY	10 % waste intercalated	
S-3	0	170	53	0	9010	1866	10876	0	18020	7183	25203
S-4	206	25	58	11948	1450	3016	16414	23896	2900	11612	38408
S-4A	254	0	56	14224	0	1747	15971	28448	0	6727	35175
S-5	162	0	86	13932	0	2580	16512	27864	0	9833	37797
S-6	0	0	100	0	0	0	0	0	0	0	0
TOTAL	622	195	353	40104	10460	9209	59773	80208	20920	35464	136582

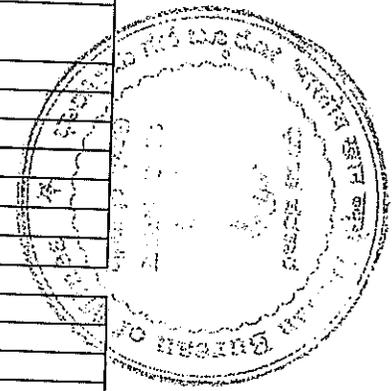
SUMMARY

PARTICULAR	ORE	DEVELOPMENT	RATIO
TONNAGE	319085	136582	0.43
VOLUMETRIC	82879	59773	0.72
TONS / CU.M	319085	59773	0.19

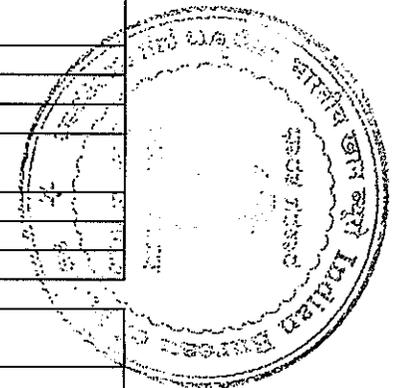
**RECLAMATION & REHABILITATION MEASURES TO BE TAKEN FOR THE FIRST YEAR**

Annexure - 9(a)

ITEMS 1	DETAILS 2	PROPOSED AREA (Ha) 3	PROPOSED QUANTITY 4	PROPOSED EXPENDITURE (LACS) 5
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	-	-
	(ii) Afforestation on backfilled area	-	-	-
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	-
	(iv) Pisciculture	-	-	-
	(v) Converting into water reservoir	-	-	-
	(vi) Picnic spot	-	-	-
	STABILIZATION & REHABILITATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-
(ii) Pitching		-	-	-
(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps ( including foundation,PCC , toe walls & Garlan drainage etc...)		-	Toewall-134 mts, Garland drainage-94 mts	3.48
(iv) Construction of Check dams along slope of vallies etc. ( SMCD,LBCD,LWCD,BWCD,GCD etc...)		-	SMCD-1,LBCD-1,GCD-4,	7.35
(v) Construction of Settling ponds (SST,ST,RWHP etc.)		-	SST-1,RWHP-2	6.71
(vi) Desilting of Settling ponds, channels		-	-	-
(vii) Afforestation on dumps		-	-	-
(viii) others (Coir- Matting)		-	-	-
REHABILITATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building in Ha)	1.79	-	4.60
	(ii) others (Road Plantation in KM)	0.7	-	0.56
	Mining pit area	-	-	-
ENVIRONMENTAL MONITORING (Core zone)	Others (CEC area)	-	-	-
	(i) Ambient Air Quality	-	1 Stn	2.96
	(ii) Water Quality	-	0	0
	(iii) Noise level data	-	1 Stn	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	2 Stns	5.92
	(ii) Water Quality	-	7 Stns	20.72
	(iii) Noise level data	-	2 stns	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
<b>Total</b>				<b>52.30</b>



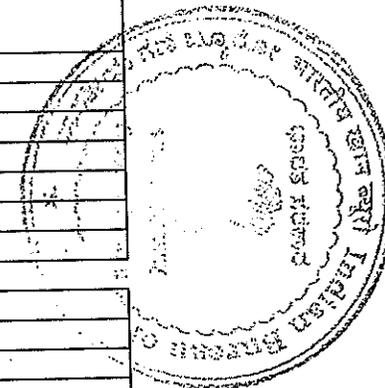
RECLAMATION & REHABILITATION MEASURES TO BE TAKEN FOR THE SECOND YEAR				
ITEMS	DETAILS	PROPOSED AREA (Ha)	PROPOSED QUANTITY	PROPOSED EXPENDITURE (LACS)
1	2	3	4	5
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	-	-
	(ii) Afforestation on backfilled area	-	-	-
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	-
	(iv) Pisciculture	-	-	-
	(v) Converting into water reservoir	-	-	-
	(vi) Picnic spot	-	-	-
STABILIZATION & REHABILITATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-	-
	(ii) Pitching	-	-	-
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps (including foundation, PCC, toe walls & Garlan drainage etc...)	-	Toewall-94 mts, Garland drainage-94 mts	2.14
	(iv) Construction of Check dams along slope of vallies etc. (LBCD, BWCD, GCD etc...)	-	SMCD-1, LBCD-1, GCD-3	8.128
	(v) Construction of Settling ponds (SST, ST, RWHP etc.)	-	RWHP-2	0.71
	(vi) Desilting of Settling ponds, channels	-	-	-
	(vii) Afforestation on dumps (viii) others (Coir- Matting)	-	-	-
REHABILITATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	-	-	-
	(ii) others (Road Plantation)	-	-	-
	Mining pit area	-	-	-
	Others	-	-	-
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	1 Stn	2.96
	(ii) Water Quality	-	0	0
	(iii) Noise level data	-	1 Stn	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	2 Stns	5.92
	(ii) Water Quality	-	7 Stns	20.72
	(iii) Noise level data	-	2 stns	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
			Total	40.58



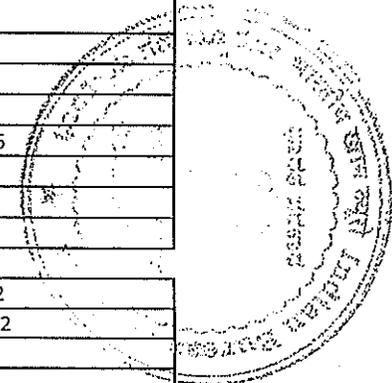
RECLAMATION & REHABILITATION MEASURES TO BE TAKEN FOR THE THIRD YEAR				
ITEMS	DETAILS	PROPOSED AREA (Ha)	PROPOSED QUANTITY	PROPOSED EXPENDITURE (LACS)
1	2	3	4	5
RECLAMATION & REHABILITATION OF MINED OUT PIT/LAND/AREA	(i) Backfilling	-	-	-
	(ii) Afforestation on backfilled area	-	-	-
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	-
	(iv) Pisciculture	-	-	-
	(v) Converting into water reservoir	-	-	-
	(vi) Picnic spot	-	-	-
STABILIZATION & REHABILITATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-	-
	(ii) Pitching	-	-	-
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps ( including foundation,PCC , toe walls & Garlan drainage etc...)	-	Toewall-94 mts, Garland drainage-94 mts	2.14
	(iv) Construction of Check dams along slope of vallies etc. ( LBCD,BWCD,GCD etc...)	-	-	-
	(v) Construction of Settling ponds (SST,ST,RWHP etc.)	-	-	-
	(vi) Desilting of Settling ponds, channels	-	-	-
	(vii) Afforestation on dumps	-	-	-
	(viii) others (Coir- Matting)	-	-	-
REHABILITATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	-	-	-
	(ii) others (Road Plantation)	-	-	-
	Mining pit area	-	-	-
	Others	-	-	-
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	1 Stn	2.96
	(ii) Water Quality	-	0	0
	(iii) Noise level data	-	1 Stn	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	2 Stns	5.92
	(ii) Water Quality	-	7 Stns	20.72
	(iii) Noise level data	-	2 stns	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
			Total	31.74



RECLAMATION & REHABILITATION 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	-	-	-
	(ii) Afforestation on backfilled area	-	-	-
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	-
	(iv) Pisciculture	-	-	-
	(v) Converting into water reservoir	-	-	-
	(vi) Picnic spot	-	-	-
STABILIZATION & REHABILITATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-	-
	(ii) Pitching	-	-	-
	(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps (including foundation, PCC, toe walls & Garlan drainage etc...)	-	Toewall- 94 mts, Garland drainage-94 mts	2.14
	(iv) Construction of Check dams along slope of vallies etc. (LBCD, BWCD, GCD etc...)	-	-	-
	(v) Construction of Settling ponds (SST, ST, RWHP etc.)	-	-	-
	(vi) Desilting of Settling ponds, channels	-	-	-
	(vii) Afforestation on dumps	-	-	-
	(viii) others (Coir- Matting)	-	-	-
REHABILITATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	-	-	-
	(ii) others (Road Plantation)	-	-	-
	Mining pit area	-	-	-
	Others	-	-	0.00
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	1 Stn	2.96
	(ii) Water Quality	-	0	0
	(iii) Noise level data	-	1 Stn	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	2 Stns	5.92
	(ii) Water Quality	-	7 Stns	20.72
	(iii) Noise level data	-	2 stns	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
			Total	31.74



RECLAMATION & REHABILITATION 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	-	-	-
	(ii) Afforestation on backfilled area	-	-	-
	(iii) Others (Please specify) e.g. Afforestation on exhausted benches	-	-	-
	(iv) Pisciculture	-	-	-
	(v) Converting into water reservoir	-	-	-
	(vi) Picnic spot	-	-	-
	STABILIZATION & REHABILITATION OF DUMPS (within & Out side lease)	(i) Terracing	-	-
(ii) Pitching		-	-	-
(iii) Construction of Parapet Wall / Retaining Wall at the toe of dumps ( including foundation,PCC , toe walls & Garlan drainage etc...)		-	Toewall-94 mts, Garland drainage-94 mts	2.14
(iv) Construction of Check dams along slope of vallies etc. ( LBCD,BWCD,GCD etc...)		-	-	-
(v) Construction of Settling ponds (SST,ST,RWHP etc.)		-	-	-
(vi) Desilting of Settling ponds, channels		-	-	-
(vii) Afforestation on dumps		-	-	-
(viii) others (Coir- Matting)		-	-	-
REHABILITATION OF BARREN AREA WITHIN LEASE (Out side lease)	(i) Afforestation (Green belt building)	-	-	-
	(ii) others (Road Plantation)	-	-	-
	Mining pit area	-	-	-
	Others	-	-	-
ENVIRONMENTAL MONITORING (Core zone)	(i) Ambient Air Quality	-	1 Stn	2.96
	(ii) Water Quality	-	0	0
	(iii) Noise level data	-	1 Stn	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
ENVIRONMENTAL MONITORING (Buffer zone)	(i) Ambient Air Quality	-	2 Stns	5.92
	(ii) Water Quality	-	7 Stns	20.72
	(iii) Noise level data	-	2 stns	-
	(iv) Ground Vibration	-	-	-
	(v) Others (Please Specify)	-	-	-
Total				31.74



# FLOW CHART OF ROM PROCESSING MOBILE CRUSHING & SCREENING PLANT

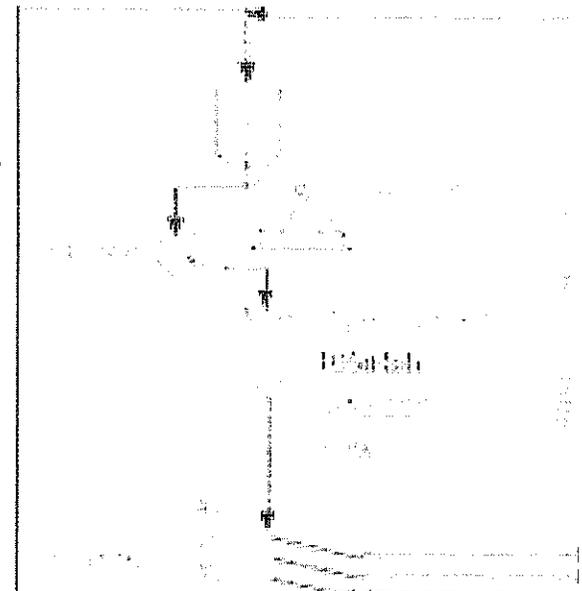
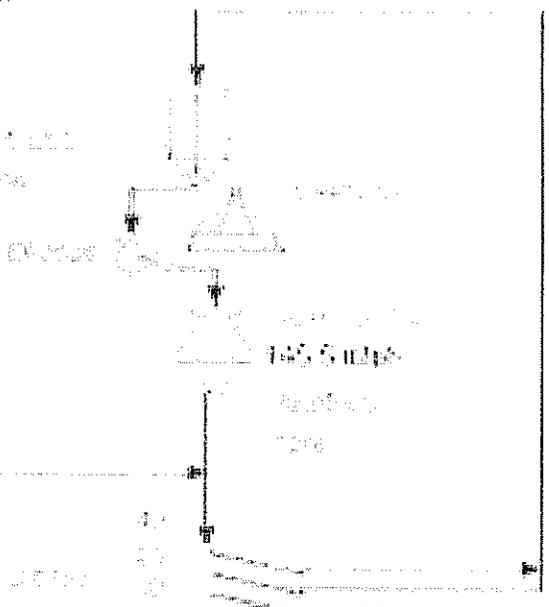
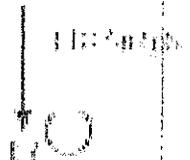
Annexure - 10



15/04/2017

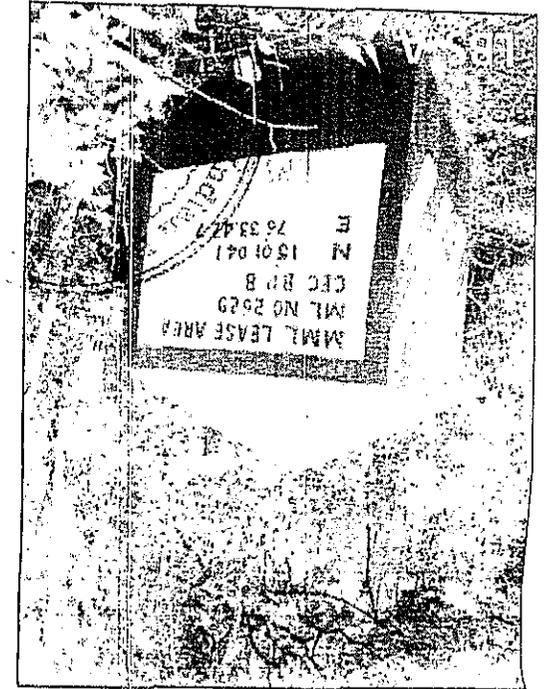
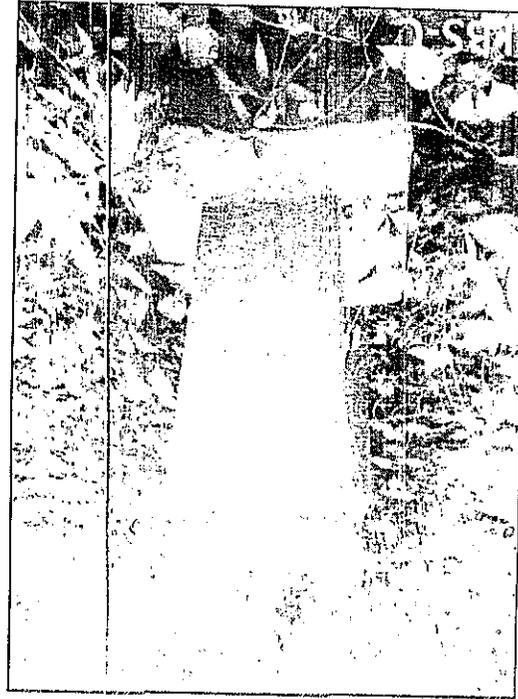
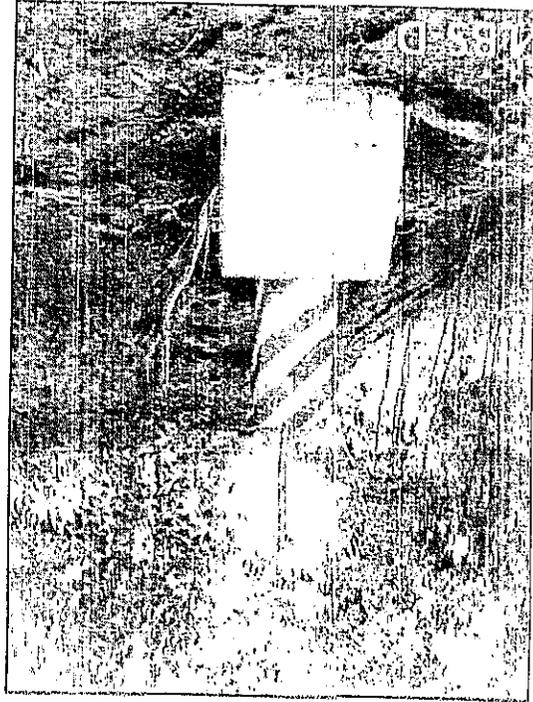
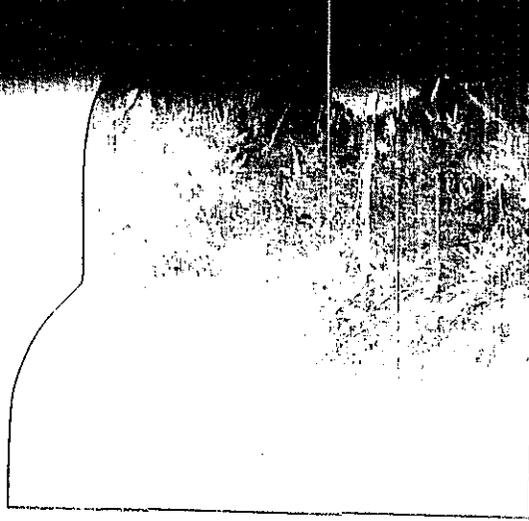
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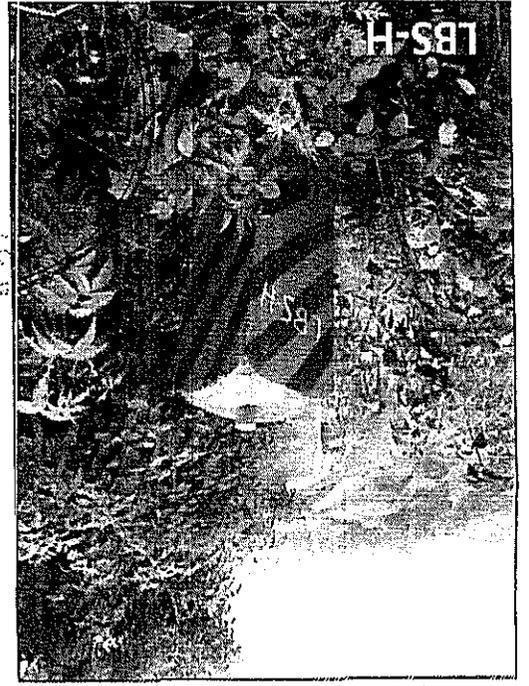
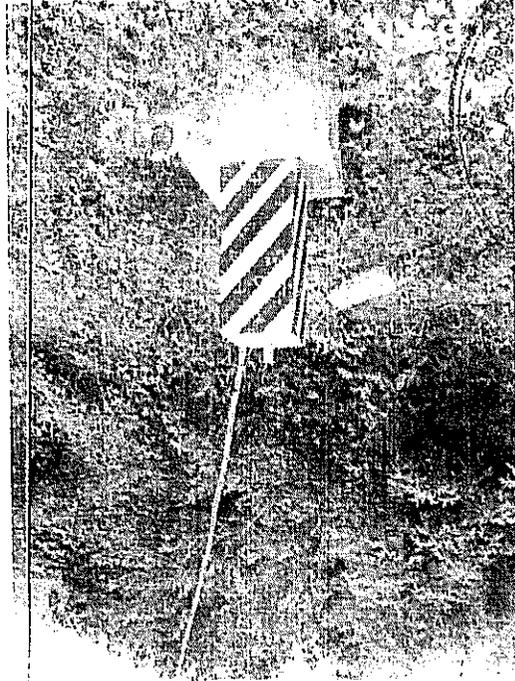
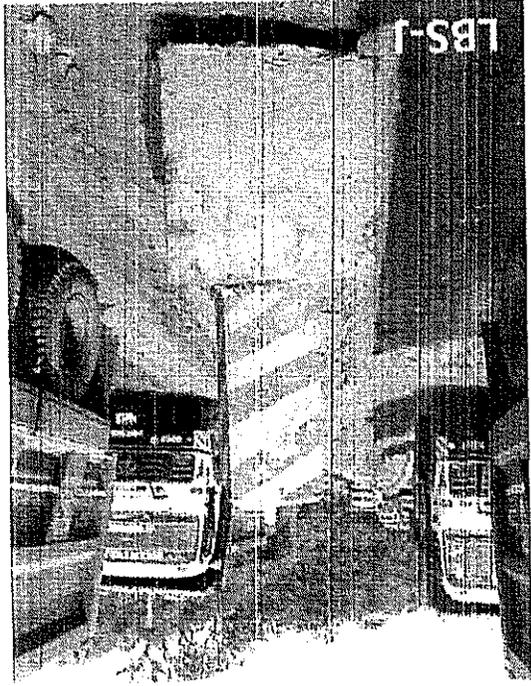
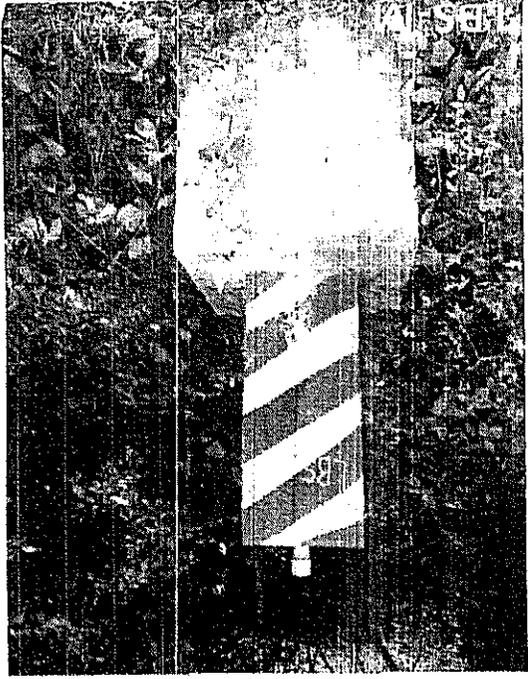


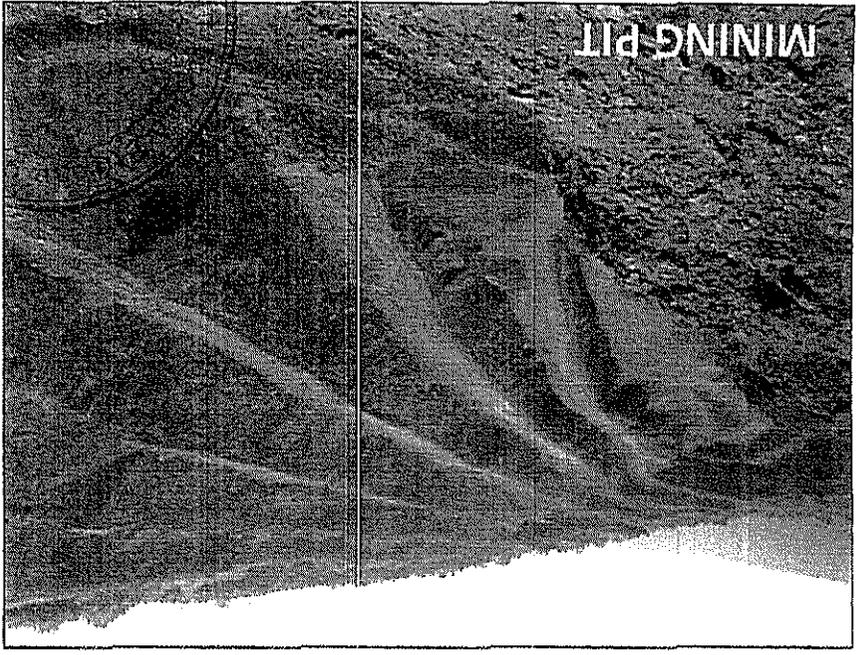
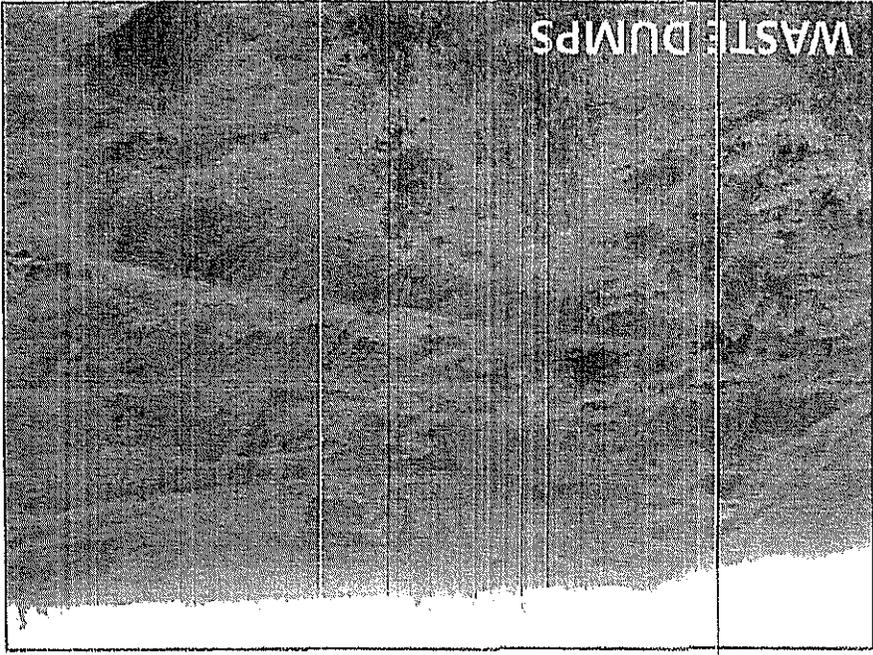
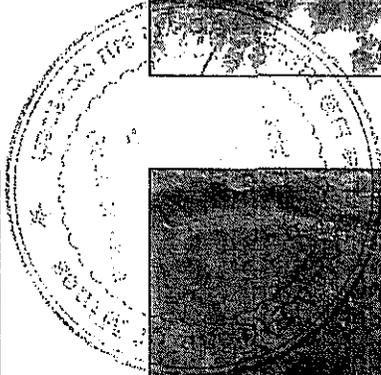
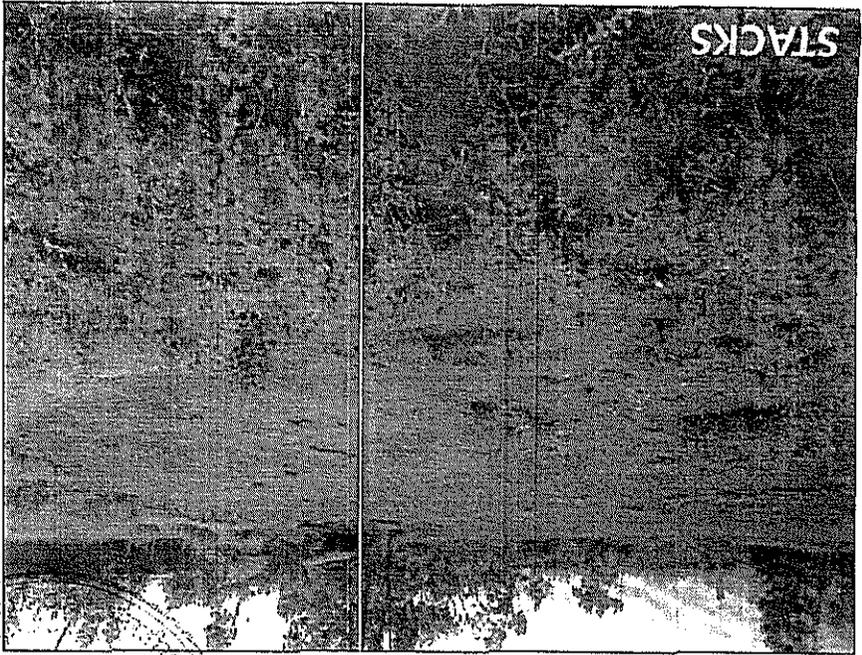
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 Special Authority:  Name: \_\_\_\_\_





MML LEASE AREA  
M.L. NO. 2529  
CFC. B.B. B.  
N. 1501041  
E. 7633447



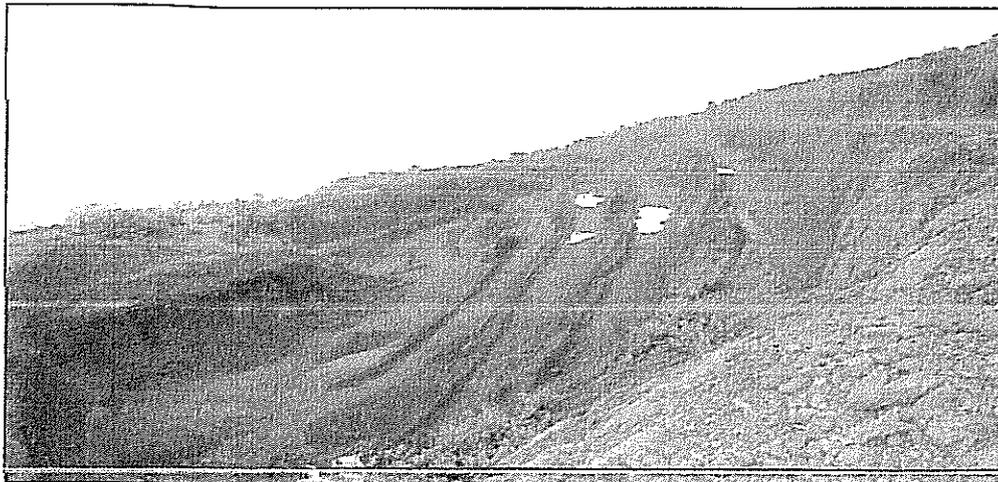




BALDOTA

**MINING PLAN**  
**(Including Progressive Mine Closure Plan)**  
**Swamimalai Iron Ore Mining Block**  
**M/s. Kartikeyas Manganese & Iron Ores Pvt.Ltd.**  
**ML No. 2559**

**Submitted under Rule 16(1) of MCR 2016**  
**By Preferred Bidder M/s. MSPL LIMITED**



**Volume -2: Plates**

**ML Area: 26.71 Ha**  
**LOI: No: DMG/MLS/CCA/12/2559/2016-17/5987**  
**Dated 26 OCT 2016**  
**Opencast, Category 'A' Fully Mechanized**  
**Proposed for 'Captive Mine'**

**Total area: 26.71 Ha**  
**Forest Area: 26.71 Ha**  
**Name of the Forest: Kumaraswamy Betta Reserved Forest**  
**Reg No: IBM / 199 / 2011**

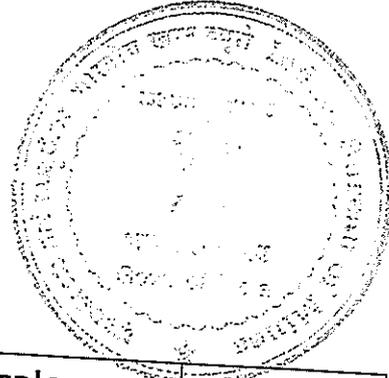
**Prepared By**

**S.Shivakumar**  
**M.Sc.Geology**

**Qualified Person**  
**October 2017**



## LIST OF PLATES



Sl.No.	Name of the Plate	Scale	Plate No.
1	CEC ML Sketch		
		1 : 2000	I
2	Key Plan		
		1:50000	II
3	Surface Plan		
		1:2000	III
4	Geological Plan		
		1:2000	IV
5	Geological Cross Sections		
		1:1000	VA
6	Longitudinal Sections		
		1:1000	VB
7	Year wise Development & Production Plan & Section for the First Year.	1:2000 1:1000	VI A
	Year wise Development & Production Plan & Section for the Second Year.	1:2000 1:1000	VI B
	Year wise Development & Production Plan & Section for the Third Year.	1:2000 1:1000	VI C
	Year wise Development & Production Plan & Section for the Fourth Year.	1:2000 1:1000	VI D
	Year wise Development & Production Plan & Section for the Fifth Year.	1:2000 1:1000	VI E
8	Conceptual Plan & Sections	1:2000	VII
9	Environment Plan	1:5000	VIII
10	Reclamation Plan	1:2000	IX
11	Financial Area Assurance Plan	1:2000	X

