

**INDIAN BUREAU OF MINES  
MINERALS DEVELOPEMMENT AND REGULATION DIVISION**

**MCDR INSPECTION REPORT**

**Bhubaneshwar regional office**

**Mine file No :** ORI/IRON/SNG/MCDR-7/BBS

**Mine code :** 30ORI13028

- (i) Name of the Inspecting : **M007** ) **SHRI HARKESH MEENA**  
Officer and ID No.
- (ii) Designation : Regional Controller Mines
- (iii) Accompanying mine : Y Nagendra, Mines Agent  
Official with  
Designation
- (iv) Date of Inspection : 08/07/2017
- (v) Prev.inspection date : 29/07/2016

**PART-I : GENERAL INFORMATION**

1. (a) **Mine Name** : **TANTRA, RAIKELA & BANDHAL**
- (b) **Registration NO.** : **IBM/4355/2011**
- (c) Category : A Mechanised
- (d) Type of Working : Opencast
- (e) Postal address
- State : ORISSA
- District : SUNDARGARH
- Village : TANTRA
- Taluka : BONAI
- Post office : TENSA
- Pin Code : 770042
- FAX No. : 95-6625-236023
- E-mail : trbmine@jindalsteel.net
- Phone : 95-6625-236023,236024
- (f) Police Station : Lahunipara
- (g) First opening date : 17/02/1990
- (h) Weekly day of rest : SUN
2. Address for : T.R.B IRON MINES  
correspondance PO-TENSA  
DIST-SUNDERGARH
3. (a) Lease Number : ORI0652
- (b) Lease area : 297.85
- (c) Period of lease : 20
- (d) Date of Expiry : 02/12/2026
4. Mineral worked : IRON ORE Main

## 5. Name and Address of the

Lessee : m/s Jindal Steel and Power Ltd  
 TRB Iron Ore Mines At  
 P.O.Tensa SUNDARGARH  
 ORISSA  
 Phone:06625 - 82023, 82024  
 FAX :

Owner : Jindal steel & power ltd  
 Barbil KEONJHAR ORISSA  
 Phone: 06767 30158  
 FAX :

Agent : Shri Y Nagendra  
 TRB Iron Ore Mines M/s  
 JSPL, Post-Tensa Sundargarh  
 SUNDARGARH ORISSA  
 Phone:  
 FAX :

## Mining Engineer

Name : B D SAHOO,Full Time  
 Qualification : BE-MINING AND FCC  
 Appointment/ : 17/09/2014  
 Termination date

## Geologist

Name : R K CHATURVEDI,Full Time  
 Qualification : M TECH IN APPLIED GEOLOGY  
 Appointment/ : 17/09/2014  
 Termination date

## Manager

Name : PANCHANAN SINGH  
 Qualification : BE-MINING AND FCC  
 Appointment/ : 26/12/2016  
 Termination date

6. Date of approval of Mining	:	Mining Scheme rule 12 MCDR1988	25/08/2000
Plan/Scheme of Mining	:	Renewal under rule 22 MCR1960	09/10/2003
	:	Modif.of approved Mining Plan	19/12/2007
	:	Mining Scheme rule 12 MCDR1988	22/03/2010
	:	FMCP under 23C(1)	29/07/2010
	:	Modif.approved Mining Scheme	11/08/2010
	:	Modif.approved Mining Scheme	23/04/2012
	:	Mining Scheme rule 12 MCDR1988	27/03/2015
	:	MP modif under MCR 1960	27/03/2015

## PART - II : OBSERVATION/COMMENTS OF INSPECTING OFFICERS

## Exploration :

Sl.No.	Item	Proposals	Actual work	Remarks
1a	Backlog of previous year	No of boreholes planned to be drilled in 2016-17 was 12 Nos.	Actual, in 2016-17, only 09 Nos of boreholes have been drilled	Back log of 3 nos of boreholes from 2016-17. Shortcoming has been pointed out to the lessee by the violation letter dated 26.07.2017.
1b	Exploration over lease area for geological axis 1 or 2		176.735 Ha has been explored under G1/G2 limit of exploration as per UNFC.	
1c	Exploration Agencies and Expenditure in lakh rupees during the year		Exploration Agency: Delvcore Mining & Machinery Pvt. Ltd, Expenditure Incurred in 2016-17 is Rs. 2191627.00.	09 Bore Hole done during 2016-17.
1d	Balance area to be explored to bring Geological axis in 1 or 2		29.346 Ha area explored under G3 limit of UNFC has to be converted into G1/G2 limit of UNFC	29.346 Ha area explored under G3 limit of UNFC has to be converted into G1/G2 limit of UNFC
1e	Balance reserve as on 01/04/20		Reserve as on 01.04.2017 (as per annual return for the year 2016-17) Proved Mineral Reserve (111) is 5.87 million tonnes Probable Mineral reserve (121) is 3.27 million tonnes Total Mineral Reserve is 9.14 million tonnes	Remaining Resources as on 01.04.2017 is 13.87 million tonnes

1f	General remarks of inspecting officers on geology, exploration etc	Around 85% of the lease area has been explored under G1/G2 limit of exploration as per UNFC. During inspection it was observed that drilling was in progress to complete the backlog of previous year boreholes (~ 3 Nos).
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## Development :

Sl.No.	Item	Propasals	Actual work	Remarks
2a	Location of development w.r.t.lease area	Patch 1: 238N - 733N / 1460E-1990E,655m bottom RL Patch 2: 84N - 370N / 1990E - 2300E,655m bottom RL Patch 3B: 638N - 960N / 458 E -922E,655m bottom RL	Patch 1: 238N - 733N / 1460E-1990E, 662m bottom RL Patch 2: 84N - 370N / 1990E - 2300E, 679m bottom RL Patch 3B:638N - 960N / 458 E - 922E, 750m bottom RL	Development carried out within the area limit approved in the scheme of mining for the period 2015-16 to 2019-20.
2b	Separate benches in topsoil, overburden and minerals (Rule 15)	Patch 1 : OB =14 / Ore=8 Patch 2: OB= 4 / Ore = 3 Patch 3B: OB=0 / Ore = 3	Patch 1 : OB =14 / Ore=8 Patch 2: OB= 4 / Ore = 3 Pacth 3B: OB=0 / Ore = 3	Separate benches in OB and Ore maintained.
2c	Stripping ratio or ore to OB ratio	1:0.631	1:0.314	Stripping ratio for Ore to OB. OB generation was more than proposed for the year 2016-17.

2d	Quantity of topsoil generation in m3	Generation of top soil proposed for the year 2016-17 was 40300 cum	Actual top soil generation in 2016-17 is 22.32 cum	Earmarked area for Top soil - 1.346 Ha.
2e	Quantity of overburden generation in m3	1499160 Cum	4334698.5 CuM	Earmarked area for overburden dump - 29.233 Ha. OB more excavated due to encounter of intercalated BHJ.
2f	General remarks of inspecting officers on development of pit w.r.t. type of deposit etc			The development of the benches have been done within the area limit approved in the scheme of mining for the period 2015-16 to 2019-20. Number of pits in operation was 3 as per scheme of mining for the year 2016-17. Generation of top soil was less than proposed for the year 2016-17 while the OB generation was more than proposed for 2016-17. Scientific method of mining is practiced.

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### Exploitation:

Sl.No.	Item	Proposals	Actual work	Remarks
3a	Number of pit proposed for production	Number of pits proposed for production in 2016-17 was three (03)., namely Patch-1, Patch-2 and Patch-3B.	Actuals numbers of pits for production in 2016-17 was three (03)., namely Patch-1, Patch-2 and Patch-3B.	Number of pits put for production is 3 as per approved scheme of mining.

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3b	Quantity of ROM mineral production proposed	ROM Production proposed in 2016-17 was 3109302MT	ROM produced in 2016-17 is 2722384MT	EC has been obtained for annual production capacity of 3.11 MT of ROM iron ore by opencast mechanized method.
3c	Recovery of saleable/usable mineral from ROM production	Recovery of saleable/usable mineral from ROM proposed in 2016-17 was 78%.	Actual recovery of saleable/usable mineral was 100% as the mineral rejects generated has been blended with high grade ROM.	Actual recovery of saleable/usable mineral was 100% as the mineral rejects generated has been blended with high grade ROM.
3d	Quantity of mineral reject generation	Quantity of Mineral Reject Generation proposed for the year 2016-17 was 684747 MT.	Actual mineral reject generation was nil as the mineral rejects generated has been blended with high grade ROM.	
3e	Grade of mineral rejects generation and threshold value declared.	Grade of mineral rejects between 45%Fe to 58%Fe, Threshold value declared is 45% Fe.	Grade of mineral rejects between 45%Fe to 58%Fe, Threshold value declared is 45% Fe.	The subgrade or mineral reject stack register alongwith grade is not maintained properly and not made available during inspection.
3f	Quantity of sub grade mineral generation.	Not Proposed	Nil Production of subgrade mineral.	
3g	Grade of sub grade mineral generation	45%Fe to 58%Fe	Nil production of subgrade mineral in 2016-17.	
3h	Manual / Mechanised method adopted for segregating from ROM	Mechanised method	Mechanised method	
3i	Any analysis or beneficiation study proposed and carried out for sub grade mineral and rejects.	Beneficiation plant is proposed to be installed and commence from 2018-19.	Beneficiation plant is yet to be installed.	

- 3j Provision of drilling and blasting in mineral benches
- Controlled blasting with 'V' pattern firing is in practice which is much safe and fragmentation is good and throw is within control. Sequential blasting is done by using electric delay detonator or NONEL system of initiation is in use to reduce vibration and fly rock and the same has been proposed to be continued during the scheme period. Rock breaker is in use to avoid secondary blasting.
- Deep hole drilling and blasting (100 mm dia. staggered pattern) followed. ANFO (Ammonium Nitrate), Class-2 explosive and non-electric shock tube initiation system with delay detonator is used

3k	Provision of mining machineries in mineral benches	It has been proposed to develop the mine in order to produce iron ore by adopting opencast method of mining alongwith deployment of HEMM for different purposes, as is being adopted now, aiming to mine at deeper level in dip direction of ore body to exploit maximum quantum of ore in a scientific method. Machines proposed to be deployed are Drill Machine IBH 10, 3.5 CuM, 2.8 CuM and 2.4 capacity shovels, 35 tonne and 31 tonner dumper, motor grader 24" blade Loader, Excavator, Dumper and Dozer etc.	The mine develop in order to produce iron ore by adopting opencast method of mining alongwith deployment of HEMM for different purposes, Machines deployed are Drill Machine IBH 10, 3.5 CuM, 2.8 CuM and 2.4 capacity shovels, 35 tonne and 31 tonner dumper, motor grader 24" blade Loader, Excavator, Dumper and Dozer etc. Mine development and production of ore is done with the help of Excavator and Dumper combination.
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3l	Whether height of benches in overburden and mineral suitable for method of mining proposed in MP/SOM	Height and width of the mining benches proposed is 9 m and 12 m respectively.	Height and width of the mining benches of 9 m and 12 m is suitable for mining method proposed in scheme of mining.	During inspection it is observed that the Bench width and height have not been maintained in Patch 1 quarry between coordinates 1700 E to 1800E & 500N to 600N.
3m	Total area covered under excavation/pits	109.207ha	101.220 ha	
3n	Ore to OB ratio for the pit/mine during the year.	1:0.631	1:0.314	
3o	Total area put in use under different heads at the end of year	Total area: 207.787 Ha. 1.Covered under current (O-C) Workings- 109.207 Ha, 2. Used for waste disposal- 29.233Ha. 3. Occupied by plant, buildings, residential, welfare buildings and roads- 26.204Ha. 4. Used for any other purpose-43.143 Ha.	Total area: 207.787 Ha 1.Covered under current (O-C) Workings-101.220 Ha, 2. Reclaimed- rehabilitated-6.6Ha, 3. Used for waste disposal-29.233Ha. 4. Occupied by plant, buildings, residential, welfare buildings and roads-26.204Ha. 5. Used for any other purpose-44.530 Ha.	

3p	Production of ROM mineral during the last five year period as applicable	2011-12 3107724 2012-13 3102974 2013-14 3107398 2014-15 3106446 2015-16 3104906	2011-12: 2539160 2012-13: 2486877 2013-14: 1842582 2014-15: 2593294 2015-16: 2922599	Excavation has been carried out as per proposal. ROM produced is 2.72 MT with the EC limit of 3.11 MT. The Mineral reject generated during the year has been blended with high grade ROM. Scientific method of mining is practiced.
3q	General remarks of inspecting officers on method of mining etc.			Three nos of pits put for production as per proposal for 2016-17. ROM generated was 2722384MT in 2016-17. Mineral rejects generated has been blended with high grade ROM.

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Solid Waste Management - Dumping:

Sl.No.	Item	Propasals	Actual work	Remarks
4a	Separate dumping of topsoil, OB and mineral rejects (Rule 32,33)	An area over 1.346 Ha have been allocated for stacking of topsoil,29.233 ha area for Overburden and 1.933 Ha. area for Mineral Reject	Dumping has been done over the allocated area approved in the scheme of mining. An area over 1.346 Ha have been allocated for stacking of topsoil,29.233 ha area for Overburden.	

4b	Location of topsoil, OB and mineral reject dumps	Topsoil-1060N to 1160N,1120E to 1460E OB-400N/1100N to 900E/1600E (730 to 831mRL) MR Dump: 1019 N/1116 N to 1452 E to 1616 E	Topsoil-1060N to 1160N,1120E to 1460E OB-400N/1100N to 900E/1600E (730 to 831mRL) MR Dump: 1019 N/1116 N to 1452 E to 1616 E	
4c	Number of dumps within lease area and outside of lease area	One number of OB dump- 400N/1100N to 900E/1600E (Inside lease area)	One number of OB Dump - 400N/1100N to 900E/1600E (Inside lease area)	One Number of Overburden dump over an area of 29.233Ha develops and maintained properly.
4d	Location of dumps w.r.t. ultimate pit limit (Rule 16)	Beyond ultimate pit limit	Location of dump is beyond UPL.	
4e	Number of active and alive dumps.	One No. of active OB dump	One No. of active OB dump	During inspection it is observed that Terracing of the OB dump from 745 mRL to 760 mRL located between coordinates 776N to 800N & 1025E to 1050E has been rain cut and not maintained properly.
4f	Number of dead dumps.	Nil.	NIL	
4g	Number of dumps established.	NIL	NIL	
4h	Whether Retaining wall or garland drain all along dumps are there.	At the base of the dump retaining wall , garland drain shall be constructed with required size and shape.	Retaining wall and garland drain have been constructed all along dump.	

4i	Length of Retaining wall or garland drain all along dumps	It has been proposed to construct 200m of Retaining wall and 200m of Garland drain in 2016-17.	Nil.	The proposal for construction of retaining wall and garland drain in 2016-17 has been completed in previous year. The cumulative length of retaining wall and garland drain are 1042.3m and 11710m respectively.
4j	Number of settling ponds	Nil. Only desilting of settling pond have been proposed.	Maintained. Check dam no.2 has been constructed during the year 2016-17.	Cummulatively there are seven nos. of check dams. Check Dam No-2 constructed in the year 2016-17 but not maintained properly.
4k	Specific comments of inspecting officer on waste dump management			There is one number of active OB dump. Protective measures such as retaining wall and garland drain are there all along dump. dumps are located within the proposed location of dumps as per approved scheme of mining. Cummulativeley there are seven nos of check dams constructed.

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Solid Waste Management - Backfilling:

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Sl.No.	Item	Propasals	Actual work	Remarks
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5a	Status of part or full extraction of mineral from mined out area before starting backfilling.	Not Proposed	Not Applicable	
5b	Area under backfilling of mined out area	Not Proposed	Not applicable	6.6 ha area already backfilled
5c	Concurrent use of topsoil for restoration or rehabilitation of mineral out area (Rule 32)	Soil occurs for about a meter thick maximum from the surface in the lease area where there is no disturbance due to mining. The materials are transported to topsoil yard by tipper being loaded by pay loader and from there to plantation as per requirement. An area over 1.346 Ha have been allocated for stacking of topsoil.	22.32 CuM of Top soil used in 2016-17Soil occurs for about a meter thick maximum from the surface in the lease area where there is no disturbance due to mining. The materials are transported to topsoil yard by tipper being loaded by pay loader and from there to plantation as per requirement. An area over 1.346 Ha have been allocated for stacking of topsoil	
5d	Total area fully reclaimed and rehabilitated	Not Proposed	Not Applicable	6.6 ha area already backfilled up to 2014-15.
5e	General remarks of inspecting officers on backfilling and reclamation etc.			Already 6.6 Ha areas have been backfilled and solid waste management is as per proposal.

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Progressive Mine Clousre Plan:

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Sl.No.	Item	Propasals	Actual work	Remarks
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6a	Whether Annual report on PMCP submitted on time and correctly. Rule 23 E(2).		Submitted on date- 29.05.2017
6b	Area available for rehabilitation (ha) .	Not proposed	Not Applicable
6c	afforestation done (ha).	Not Proposed	Not Applicable
6d	No. of saplings planted during the year	Not proposed	Cummulative 6633 Nos of saplings planted during the year 2016-17.
6e	Cumulative no .of plants	Not Proposed	Cummulatively 202621Nos of saplings have been planted.
6g	Cost incurred on watch and care during the year	2.2 lakh	3.09 lakh
6h	Compliance on reclamation and rehabilitation by backfilling (i) Voids available for backfilling ( Lx B x D	Not proposed	Not applicable
6i	Compliance on reclamation and rehabilitation by backfilling (ii) Voids filled by waste / tailings	Not Proposed	Not Applicable
6j	Compliance on reclamation and rehabilitation by backfilling (iii)Afforestati on on backfilled area	Not Proposed	6618 Nos planted.

6k	Compliance on reclamation and rehabilitation by backfilling (iv) Rehabilitation by making water reservoir	Not Proposed	Not Applicable	
6l	Compliance on reclamation and rehabilitation by backfilling (v)any other specific means.	Not proposed	Not Applicable	
6m	Compliance of rehabilitation of waste land within lease (i)afforestation	Not proposed	Not Applicable	
6n	Compliance of rehabilitation of waste land within lease (ii)Area rehabilitation (ha)	Not Proposed	Not Applicable	
6o	Compliance of rehabilitation of waste land within lease (iii)Method of rehabilitation	Not proposed	Not applicable	
6p	Compliance of environmental monitoring (core zone and buffer zone)	YES	YES	
6q	General remarks of inspecting officers on PMCP compliance and progressive closure operations etc.			Environmental Parameters in core and buffer zone is within the prescribed limit. Paramaters of PMCP have been complied.

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Mineral Conservation:

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Sl.No.	Item	Propasals	Actual work	Remarks
7a	ROM Mineral dispatch or grade-wise sorting within lease area	YES	Dispatch: Lumps-383116.030MT, 58% and above. Fines-1825929.115MT, 55% and above.	
7b	Method of grade-wise mineral sorting i.e. manual or mechanical.	Mechanised	Mechanised	
7c	Different grade of mineral sorted out at mines.	YES	YES	
7d	Any beneficiation process at mines .	Beneficiation plant is proposed to be installed and commence from 2018-19	Beneficiation plant is yet to be installed.	
7e	General remarks of inspecting officer on Mineral conservation and beneficiation issues			No beneficiation process at mines and Mineral conservation is as per approved Scheme of Mining.

#### Environment:

Sl.No.	Item	Propasals	Actual work	Remarks
8a	Separate removal and utilization of topsoil (Rule 32)	An area over 1.346 Ha have been allocated for stacking of topsoil	An area over 1.346 Ha have been allocated for stacking of topsoil and top soil is used for plantation purpose.	
8b	Concurrent use or storage of topsoil	Top soil shall be used for plantation purpose.	22.32 CuM of Top soil used in 2016-17 for Plantation purpose.	



8c	Separate dumps for overburden, waste rock, rejects and fines (Rule 33)	OB Dump :450 N/800 N to 1300 E to 1600 E, MR Dump: 1019 N/1116 N to 1452 E to 1616 E	OB Dump :450 N/800 N to 1300 E to 1600 E, MR Dump: 1019 N/1116 N to 1452 E to 1616 E	
8d	Use of overburden, waste rock, rejects and fines dumps for restoring the land to its original use	Not Proposed	Not Applicable	
8e	Phased restoration, reclamation and rehabilitation of lands affected by mining operations (Pits, dumps etc)	Not proposed	Not Applicable	
8f	Baseline information on existence of plantation and additional plantation done (Rule 41)		6633 No. of Saplings planted during the year	Cumulative 202621 No of plant has been planted
8g	Survival rate		72%	
8h	Water sprinkling on roads to control airborne dust	YES	YES	

8i	General remarks of inspecting officer on aesthetic beauty in and around mines area	Separate removal and utilization of topsoil is being practiced. Fixed water sprinkler and 28KL mobile water tanker is used for dust suppression. Separate dumps for overburden, waste rock, rejects and fines as per approved Scheme of Mining. Aesthetic beauty in and around mines has been maintained.
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Compliance of Rule 45:

Sl.No.	Item	Propasals	Actual work	Remarks
9a	Status of submission of Monthly and Annual returns		Monthly Return has been submitted upto June 2017. Annual Return for 2016-17 has been submitted.	
9b	Scrutiny of Annual return for information on Mining Engineer, Geologist and Manager		Graduate Mining Engineer: 7; Diploma Mining Engineer: 5; Geologist: 3, Surveyor:1.	

9c	Scrutiny of Annual return on land use pattern for area under pits, reclaimed area, dumps etc.	Lease area (surface area) utilization as at the end of year (Ha) (i) Already exploited and abandoned by opencast (O-C) mining: 6.6 (ii) Covered under current (O-C) Workings :101.220 (iii) Reclaimed-rehabilitated- 6.6 (iv) Used for waste disposal- 29.233 (v) Occupied by plant, buildings, residential, welfare buildings and roads- 26.204 (vi) Used for any other purpose (specify) (Mineral Storage, Top soil, Tailing Pond, Green Belt, Safety Zone ) 42.824 1.70
9d	Scrutiny of Annual return on afforestation	Number of trees planted during the year within lease area is 6633 Nos.
9e	Scrutiny of Annual return on mineral reject generation (Grade and quantity)	Mineral Reject generation is nil Mineral reject generated has been blended with high grade ROM.

9f	Scrutiny of Annual return on ROM stock and/or graded ore	<p>Open Cast workings: Opening Stock of ROM: Nil; Production: 2722384.00 MT; Closing Stock of ROM: Nil Graded Ore: Lump closing stock between 58% Fe to below 60% is 342548.67 MT Lump closing stock between 62% Fe to below 65% is 1124.906 MT Lump closing stock above 65% is 1660.23 MT</p> <p>Fines closing stock between 55% to below 58% is 16.28 MT</p> <p>Fines closing stock between 58% to below 60% is 515374.587 MT</p> <p>Fines closing stock between 62% to below 65% is 15.964 MT</p>	<p>Open Cast workings: Opening Stock of ROM: Nil; Production: 2722384.00 MT; Closing Stock of ROM: Nil Graded Ore: Lump closing stock between 58% Fe to below 60% is 342548.67 MT Lump closing stock between 62% Fe to below 65% is 1124.906 MT Lump closing stock above 65% is 1660.23 MT</p> <p>Fines closing stock between 55% to below 58% is 16.28 MT</p> <p>Fines closing stock between 58% to below 60% is 515374.587 MT</p> <p>Fines closing stock between 62% to below 65% is 15.964 MT</p>
9g	Scrutiny of Annual return on sale value, Ex. Mine price and production cost	<p>Ex-Mine Price for lump between 58% Fe to below 60% is Rs. 830.83</p> <p>Ex-Mine Price for fines between 58% Fe to below 60% is Rs. 830.80</p>	<p>Ex-Mine Price for lump between 58% Fe to below 60% is Rs. 830.83</p> <p>Ex-Mine Price for fines between 58% Fe to below 60% is Rs. 830.80</p>
9h	Scrutiny of Annual return on fixed assets	Value of Fixed Assets - Rs. 652697389	Value of Fixed Assets - Rs. 652697389

9k      Scrutiny of            Backhoe: 10No, Backhoe: 10No, Shovel: 3  
Annual return on      Shovel: 3 Nos; Nos; Wheel Loader: 6  
mining                    Wheel Loader: Nos; Dumper: 50 Nos;  
machineries            6 Nos; Dumper: Dozer:4; Rock Drill: 1  
                                 50 Nos;            No etc  
                                 Dozer:4; Rock  
                                 Drill: 1 No  
                                 etc

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**Details of violations observed during current inspection and compliance position of violation pointed out**

Violation observed				Show cause position			
Rule NO.		Issued on	Compliance on	Rule NO.		Issued on	Compliance on
MCDR17	Rule 11(1)	26/07/2017	18/10/2017				
MCDR17	Rule 54(c)	26/07/2017	18/10/2017				

**Date :****(SHRI HARKESH MEENA)**

Indian Bureau of Mines