

Date: 26.05.2017

To,  
The Additional Director (South)  
Ministry of Environment and Forest  
Regional Office (Southern Zone)  
Kendriya Sadan, IVth Floor, E & F Wings  
17<sup>th</sup> Main Road, II Block, Kormangala  
Bangalore – 560 034

**Sub: Six monthly compliance report of Surla- Sonshi Iron Ore Mine, Village Surla, Kudnem & Sonshi Onvoliem, Bicholim and Sattari Talukas, North- Goa (T.C No 21/1954, 5/1954, 20/1954) for the period October 2016 to March 2017.**

Respected Sir,

We are herewith submitting the condition wise compliance report & corresponding annexures and CD as per the conditions laid down in the Environmental Clearance Letter No: J-11015/44/2004-IA.II(M) dated 01/01/2008 for the period **October 2016 to March 2017**.

Yours faithfully,  
For Sesa Resources Ltd.



Mr. Ulhas Betkiker  
Mines Manager  
Surla-Sonshi Iron Ore Mine

**Enclosed:** Six monthly compliance report & corresponding annexures and CD of Surla Sonshi Iron Ore Mine for the period October 2016 to March 2017.

**C.C:** 1. Member Secretary, Goa State Pollution Control Board  
2. CGWB

**SESA RESOURCES LIMITED:**

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CIN: U13209GA1965PLC000030



**Compliance To Conditions of Environmental Clearance Issued By**  
**Ministry of Environment and Forests For**  
**SURLA-SONSHI IRON ORE MINE**

**T.C. No. 21/1954, T.C. No. 5/1954 and T.C No.20/1954**

**Letter No: J-11015/44/2004-IA.II(M)**

**Production: 1.1 MTPA as per Environment clearance, however the current production limit is 1.00 MTPA  
as per capping imposed by State Government**

**Period –October 2016 –March 2017**

**A. SPECIFIC CONDITIONS:-**

Sl. No.	Conditions of Environmental Clearance	Status of Compliance	Remarks
(i)	The environmental clearance is accorded only for two years during which period detailed hydrogeological study (quality and quantity) on impact of mining on hydrogeology (pre-monsoon, monsoon and post-monsoon) shall be carried out and the report submitted to Ministry. (Stands deleted as per MoEF letter no. J-11015/44/2004-IA.II(M) dated January 1, 2008).	Hydrogeological study is carried out and report was submitted to the Ministry of Environment & Forests. Ministry extended the period of environmental clearance vide MoEF letter no. J-11015/44/2004-IA.II (M) dated January 1, 2008).	
(ii)	Mining shall not be undertaken in forestland within the lease area for which forestry clearance/permission has not been obtained.	Is being complied. (Forest clearance has been obtained for diversion of 24.9810 ha forest area under TC No 21/1954 (letter no. F. No. 8-490/1989-FC dated 28th Jan 2009))	
(iii)	No dumping of OB where natural slopes already exceeding 28° angle.	No dumping is carried out where the natural slope exceeds 28° angle.	
(iv)	Top soil should be stacked properly with adequate measures at earmarked sites. It should be used for reclamation and rehabilitation' of the mined out areas.	The mine is in operation for last 50 years and Most of the areas within the mining lease are broken up for mining. Hence there is no generation of top soil.	
(v)	OB and other wastes should be stacked at earmarked sites only and should not be kept active for long periods of time. Plantation should be taken up for soil stabilisation along the slopes of the dump and terraced after every 5-6 m of height and overall slope angle shall be maintained not exceeding 28°. Sedimentation pits shall be constructed at the corners of the garland drains. Retention/Toe walls shall be provided at the base of the dumps.	Plantation is undertaken along the dead dump slopes. Protective walls are provided. Overburden is stacked properly and the dumps are also stabilized with the geotextile and fast growing native species. The un-finalized dumps are covered with Silpaulin. Garland drains are being constructed at the toe wall of the dump.	
(vi)	Use of geotextiles for dump stabilisation shall	Geotextile are extensively used for	



	be taken up in the critical areas.	covering dump slopes to prevent soil erosion.	
(vii)	<p>Catch drains, and siltation ponds of appropriate size, gully plugs and check dams should be constructed to arrest silt and sediment flows from the mining operations, Desilting operations shall be undertaken regularly and particularly after very monsoon.</p> <p>Garland drain (size, gradient &amp; length) shall be constructed for both mine pit and for the waste dump. Sump capacity should be designed keeping 50 % safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material. Sedimentation pits should be constructed at the corners of the garland drains. Desilting operations shall be undertaken after very monsoon.</p>	<p>All the runoff water is channelized into mining pits. Additionally garland drains and series of settling ponds of appropriate size and check dams are constructed to arrest silt and to ensure no sediment flow from the mining operations. Desilting of the settling ponds to increase their capacity is carried out before the onset of monsoon every year.</p>	
(viii)	Drills should be wet operated or with dust extractors.	Wet drilling method is practiced with dust extractors.	
(ix)	Controlled Blasting should be practiced and only during daytime. The mitigative measures for control of ground vibrations to arrest the fly rocks and boulders should be implemented.	Controlled blasting with Nonel technology is adopted wherever hard rock is encounter and adequate precaution are taken. Blasting if any is carried out only during the day time. Necessary safety measures are taken during blasting.	
(x)	Water sprinkling system should be provided to check fugitive emissions from ancillary operations such as crushing, screening plant, etc.	Regular water sprinkling is done to check fugitive emission.	
(xi)	Measures shall be taken for proper maintenance of vehicles used in mining operations and in transportation of mineral ore and in ensuring that emissions are within prescribed norms. The vehicles should be covered with tarpaulin and should not be overloaded.	Proper maintenance of vehicles and mining machinery is done to ensure that emissions are within prescribed norms. Utmost care is taken to ensure that all trucks are covered with tarpaulin and not overloaded. Also PUC certificates for transportation vehicles are maintained.	
(xii)	Plantation shall be done which includes a green belt of adequate width around the ML area, along roads, OB dumps and non mineralised areas identified for plantation by planting suitable native species in consultation with the local DFO/Agriculture Department. The density of trees should be around 2500 plants per hectare. Substantial allocation of funds shall be	Plantation is done by planting native species like cashew. Total plantation carried for the year 2016-2017 is 500 Nos within mining lease in an area of 0.2 ha	



	made for afforestation and reclamation and details furnished to the Ministry and to the MOEF RO, Bangalore.		
(xiii)	A Progressive Mine closure plan clearly indicating the year of backfilling, area to be backfilled, quantum of OB to be backfilled and are to be reclaimed with plantation shall be prepared and implemented.	Progressive Mine Closure Plan is prepared and approved by IBM wherein details of reclamation are covered.	
(xiv)	Water harvesting measures should be taken up in and around mine site. Further, desiltation shall be done every year before the onset of monsoon.	The rain water falling within the lease area is channelized into mining pits through trenches and garland drains. The water thus harvested is used for activities like beneficiation and dust supersession.	
(xv)	Prior approval of the MOEF and CGWA shall be obtained for using groundwater for mining operations. Additional water requirement, if any, shall be met from recycling of water from mining/processing operations and from water harvesting measures.	Permission from competent authority obtained. Permission from WRD for pumping water from Mine pit is obtained for Surla Mine via registration certificate No. R-10/MIN-04/16 dated 22/12/2016.	
(xvi)	Regular monitoring of ground water level and quality should be carried out by establishing a network of existing wells and constructing new piezometers at suitable locations in project area. The frequency of monitoring should be minimum four times a year – January, pre monsoon (April/May), monsoon (August), post monsoon (November), and winter (January) seasons for groundwater level and in May for quality, particularly for heavy metals. Data generated from groundwater regime monitoring will be submitted to CGWB, Regional office on an annual basis. The monitoring shall include levels of heavy metals including iron.	Regular monitoring of Ground water level and quality is carried out and the reports are submitted to CGWB and MoEF. Settling ponds are constructed at suitable places in the mine, The settling ponds, are de-silted every year.	Ground water Level and Quality monitoring results are attached as <b>Annexure 1</b>
(xvii)	A Final Mine Closure Plan along with details of Corpus Fund should be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	Final mine closure plan approved by IBM would be submitted to MOEF in due course of time in accordance with Rule 23(c) of MCDR 1988.	
(xviii)	Consent to Operate shall be obtained from the SPCB for expansion of mining operations.	Consent to operate and authorization under Water Act 1974, Air Act 1981 and Hazardous Waste Rules, 2008 from Goa State Pollution Control Board (letter No. 5/5009/15-PCB/CI-572 dated 7th September 2015) is obtained.	
(xix)	Environmental Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation vs Union of India	Complied.	



	in Civil Writ Petition No. 460 of 2004, as may be applicable to this project.		
(xx)	Adequate measures for soil erosion, prevention and control shall be undertaken. Details of implementation on the same shall be submitted to the regional Office of the Ministry within 6 months.	Environmental protection measure is being taken before the onset of monsoon season every year. Proposed environmental protective measures for the year 2017-18 are: 1. Silpaulin Laying: 35000 m <sup>2</sup> 2. Plantation: 2000 no's 3. Boulder wall: 1000m <sup>3</sup>	

**B. GENERAL CONDITIONS:-**

Sl. No.	Conditions	Compliance	Remarks
(i)	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.	There is no change in mining technology. All the workings are carried out as per the approval granted by Indian Bureau of Mines.	
(ii)	No change in the calendar plan including excavation, quantum of iron ore, waste dumps should be made.	There won't be any changes in the plan including excavation, quantum of mineral iron ore and waste is been made.	
(iii)	Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for monitoring RPM, SPM, NOX and SO <sub>2</sub> . Location of the ambient air quality stations should be decided based on meteorological data, topographical features and environmentally and ecologically sensitive targets and the frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.	Ambient air monitoring is conducted as per NAAQS in buffer zone (four locations) and Mine Specific Standard in core zone (four locations). Monitoring is carried out by an in-house MoEF accredited laboratory. Reports submitted to State Pollution Control Board.	Graphical Representation of Air Monitoring Results are attached as <b>Annexure-1</b>
(iv)	Data on environmental quality should be regularly submitted to the Ministry including its Regional Office at Bangalore and the State Pollution Control Board/Central Pollution Control Board once in six months.	Regular monitoring for water and Air quality is carried out and the reports are submitted to MoEF regional office and Goa State Pollution Control Board. Graphical Representation of Air Results are attached as <b>Annexure-1</b> and	



(v)	Adequate measures for control of fugitive emissions should be taken during drilling & blasting operations, loading and transportation of mineral, etc. Fugitive dust emission should be regularly monitored and data recorded properly. Water spraying arrangement over haul roads, loading and unloading points and transportation of minerals, etc. should be provided and properly maintained.	Adequate measures for control of fugitive emissions are being taken during drilling & blasting operations, loading and transportation of mineral, etc.	
(vi)	Adequate measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operations of HEMM, etc., should be provided with ear plugs/muffs.	Adequate measures are being taken for control of noise levels below 85 dB(A) in work environment. Workers engaged in blasting and drilling operations, operations of HEMM, etc. are provided with ear plugs / muffs.	
(vii)	Industrial waste water (workshop and wastewater from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 <sup>th</sup> May 1993 and 31 <sup>st</sup> December 1993 or as amended from time to time. Oil and grease trap should be installed in the mine for treatment before discharge of effluents from the workshop. There shall be no discharge of wastewater from the mine site even during peak monsoon season.	Waste water generated by vehicle washing is properly collected, treated and reused. Oil and grease trap is installed in the mine for treatment of the waste water from workshop and reused.	
(viii)	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance programme of the workers should be undertaken periodically and corrective measures taken, if required.	Regular monitoring of workers health is being carried out. However, for the safety of workers at site, engaged at strategic location/dust generation points like loading and unloading points, dust masks are provided. Company has employed doctor who is trained in occupational health. Periodic personal dust monitoring is carried out for the employees for the exposure to dust and health records are maintained.	
(ix)	The data on environmental quality should be collected and analysed either through an in-house environmental laboratory established with adequate number and type of pollution monitoring and analysis equipment or got analysed through an approved laboratory under the Environment (Protection) Rules, 1986 in consultation with the State Pollution Control Board.	Regular Monitoring is carried out for environmental quality parameters through an in-house MoEF accredited Laboratory situated in Codli Mines, Kirlapal- Dabal, Goa.	



(x)	A separate environmental management cell with suitable qualified personnel should be set up under the control of a senior executive who will report directly to the head of the organization.	Environment management cell consists of multidisciplinary qualified personnel. The department reports to the head of the organization.															
(xi)	The funds earmarked for environmental protection measures should be kept in separate account and not diverted for any other purpose. Year-wise expenditure should be reported to the Ministry of Environment & Forests.	<p>Separate funds are earmarked in the revenue budget for various environment activities like Reclamation, Dust suppression, Erosion control measures, water treatment etc. and are properly tracked. Year wise expenditure earmarked for environmental protection is regularly reported to MoEF.</p> <p>The total Expenditure towards Environmental protective measures for the year 2016-17 is :</p> <table><tr><th>Purpose</th><th>Amount in Rs</th></tr><tr><td>General expenditure</td><td>633,646.60</td></tr><tr><td>Statutory requirement</td><td>2,991,677.60</td></tr><tr><td>Mine reclamation</td><td>37,950.00</td></tr><tr><td>Erosion control</td><td>1,597,602.59</td></tr><tr><td>Dust suppression</td><td>1,940,631.50</td></tr><tr><td>Total</td><td>7,201,508.29</td></tr></table>	Purpose	Amount in Rs	General expenditure	633,646.60	Statutory requirement	2,991,677.60	Mine reclamation	37,950.00	Erosion control	1,597,602.59	Dust suppression	1,940,631.50	Total	7,201,508.29	
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(xii)	The project authorities should inform to the Regional Office located at Bangalore regarding date of financial closures and final approval of the project by the concerned authorities, and the date of start of land development work.	Regional office, Bangalore is kept informed regarding date of final closure and final approval of the project by the concerned authorities.															
(xiii)	The Regional Office of this Ministry located at Bangalore shall monitor compliance of the stipulated environmental conditions. The project authorities should extend full cooperation to the officer(s) of the Regional Office by furnishing the requisite data/information/ monitoring reports.	All necessary support is provided during the visit and data will be furnished as per the requirements.															
(xiv)	A copy of the clearance letter should be marked to concerned Panchayat/local NGO, if any, from whom any suggestion/ representation has been	A copy of the clearance letter is marked to concern Panchayat.															

	received while processing the proposal.		
(xv)	The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the collector's/ Tehsildar's Office for 30 days.	Complied.	
(xvi)	The project authorities should advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within 7 days of issuance of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at web site of the Ministry of Environment and forests at <a href="http://envfor.nic.in">http://envfor.nic.in</a> .	Advertisement in two local newspapers widely circulated was published. A copy of the same was submitted to your good office.	



# M/s Sesa Environment Laboratory

Vedanta Limited, Mining Division, Codli Mines, P.O. Kirlapale, Goa-403727

Recognised by Ministry of Environment, Forests and Climate change, Govt. of India Vide Notification .S.O.137(E). Dated 12th January 2015, up to 11.01.2020

\* Certified by ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007

## Well Water Analysis Report

Date of Receipt of sample: 17.01.2017  
Analysis completion date: 30.01.2017

Mine Name: Surla Mine  
Date of Sample collection : 17.01.2017  
Standard method used for analysis: APHA Standard  
Test Report No: 229

Parameter	Unit	Permissible Limit	Location			
			Mine Garage Well	Behind New Admin Office Well	Surla jetty Well	Khodgini Well
Colour	Hazen	<5.0	<5	<5	<5	<5
pH	-	6.5-8.5	6.34	6.56	6.22	6.51
Turbidity	NTU	5	0.9	0.8	0.9	1.0
Conductivity	µs/cm	-	34	52	68	200
Dissolved Solids	mg/lit	500	16	26	34	100
Suspended Solids	mg/lit	-	1	2	2	2
Chloride	mg/lit	250	5	7	14	15
Total Hardness as CaCO3	mg/lit	200	10	7	14	72
Calcium as Ca++	mg/lit	75	2	5	4	16
Magnesium as mg++	mg/lit	30	0.97	1.94	0.97	7.78
Sulphate as SO4	mg/lit	200	2.1	3.5	1.2	6.3
Nitrate as NO3	mg/lit	45	0.1	0.1	0.1	0.1
Alkalinity	mg/lit	200	25	26	16	131
Iron as Fe	mg/lit	0.3	0.06	0.05	0.10	0.09
Manganese as Mn	mg/lit	0.1	0.03	BDL	0.03	0.03
MPN/100ml	mg/lit	Absent	Absent	8.3	13	25

BDL- Below Detection Limit

Govt. Analyst



f. Sharma  
Laboratory Incharge

valid



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### Well Water level Report


Mine Name: Surla mine

Instrument Used: Well water tape

Sr.No	Location	Total Depth of well	Depth of Water level from the reference point in mtrs	Water Column in mtrs
			17-01-2017	17-01-2017
1	Well-Surla Jetty	7.08	4.5	2.58
2	Well Khodgini	6.9	5.8	1.1
3	Well Near Mine Garage Office	7.5	5.2	2.3
4	Well surla Village	6.16	3	3.16
5	Well behind New Admin Office	7.2	4.8	2.4

  
Govt Analyst



  
Laboratory Incharge



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**Surface water Analysis Report for the month of January 2017**

Mine Name: Surla Mine

Date of Sample collection: 21.01.2017

Standard method used for analysis: APHA Standard

Test Report No: 228

Date of Receipt of sample: 21.01.2017

Analysis completion date : 27.01.2017

Parameter	Unit	Permissible limits	Location					
			Nallah water- Bhillem	Sonshi Nallah Water- Entry to Mine	Sonshi Nallah water- Exit from Mine	Mine discharge to paddy fields	Upstream river Mandovi	Downstream river Mandovi
Colour	Hazen	----	<5	<5	<5	<5	<5	<5
pH	----	5.5 to 9.0	6.61	6.6	6.5	6.6	6.72	6.40
Turbidity	NTU	----	0.9	0.9	0.9	1.7	2.1	2.5
Dissolved Solids	mg/lit	----	54	28	26	30	7452	7941
Conductivity	µS/cm	----	108	52	52	58	11064	11544
Suspended Solids	mg/lit	100	2	2	2	2	3	3
Chlorides	mg/lit	----	7	7	7	6	5211	5310
Total Hardness as CaCO <sub>3</sub>	mg/lit	----	50.0	24.0	22.0	20.0	2000	2100
Calcium as Ca <sup>++</sup>	mg/lit	----	13	5	4	4	200	200
Magnesium as Mg <sup>++</sup>	mg/lit	----	4	3	3	2	365	389
Sulphate as SO <sub>4</sub>	mg/lit	----	2	2.1	1	2	447.0	489.0
Phosphate as PO <sub>4</sub>	mg/lit	5	0.1	0.1	BDL	BDL	0.1	0.1
Nitrate as NO <sub>3</sub>	mg/lit	10	BDL	BDL	BDL	BDL	0.3	0.6
B.O.D (3days, 27°C)	mg/lit	30	<3	<3	<3	<3	4	5
C.O.D	mg/lit	250	<10	<10	<10	<10	18	28
Total Iron	mg/lit	3	0.16	0.18	0.10	0.12	0.15	0.18
Manganese as Mn	mg/lit	2	0.07	0.06	0.07	0.05	0.05	0.06
D.O	mg/lit	----	7	7	7	7	7	7
Oil & Grease	mg/lit	10	Nil	<1	<1	1	1.6	1.5

Note :- No water discharge from SMBP & SBP Tailing Pond.

BDL- Below Detection Limit

Govt. Analyst



Laboratory Incharge



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## Surface water Analysis Report for the month of February 2017

Mine Name: Surla Mine

Date of Sample collection: 20.02.2017

Standard method used for analysis: APHA Standard

Test Report No: 247

Date of Receipt of sample: 20.02.2017

Analysis completion date : 25.02.2017

Parameter	Unit	Location				
		Permissible limits	Nallah water-Bhilleim	Mine discharge to paddy fields	Upstream river Mandovi	Downstream river Mandovi
Colour	Hazen	----	<5	<5	<5	<5
pH	----	5.5 to 9.0	6.69	6.73	6.78	6.71
Turbidity	NTU	----	0.9	1.1	2.6	2.5
Dissolved Solids	mg/lit	----	58	32	13132	13111
Conductivity	µS/cm	----	116	64	26264	26222
Suspended Solids	mg/lit	100	2	2	3	3
Chlorides	mg/lit	----	7	7	6303	6402
Total Hardness as CaCO <sub>3</sub>	mg/lit	----	50	22	3500	3300
Calcium as Ca <sup>++</sup>	mg/lit	----	13	5	802	762
Magnesium as Mg <sup>++</sup>	mg/lit	----	4	2	365	340
Sulphate as SO <sub>4</sub>	mg/lit	----	2	2.8	780.0	760.0
Phosphate as PO <sub>4</sub>	mg/lit	5	0.1	BDL	0.2	0.1
Nitrate as NO <sub>3</sub>	mg/lit	10	BDL	BDL	0.6	0.6
B.O.D (3days, 27°C)	mg/lit	30	<3	<3	<3	<3
C.O.D	mg/lit	250	<10	<10	<10	<10
Total Iron	mg/lit	3	0.18	0.15	0.18	0.19
Manganese as Mn	mg/lit	2	0.08	0.06	0.07	0.06
D.O	mg/lit	----	7	7	6.6	6.3
Oil & Grease	mg/lit	10	Nil	<1	1.4	1.6

Note :- No water discharge from SMBP & SBP Tailing Pond, Sonshi hallah entry to mine & exit from.

BDL- Below Detection Limit

Govt. Analyst



*[Signature]*



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### Well Water level Report

Mine Name: Surla mine

Instrument Used: Well water tape

Sr.No	Location	Total Depth of well in mtrs	Depth of Water level from the reference point in mtrs	Water Column in mtrs
1	Well Surla Jetty	7.08	5.1	1.98
2	Well Khodgini	6.9	6.3	0.6
3	Well Near Mine Garage Office	7.5	6.1	1.4
4	Well surla Village	6.16	3.4	2.76
5	Well behind New Admin Office	7.2	5.6	1.6



*f. Seshama*

Laboratory Incharge

*[Signature]*

Authorized Govt. Analyst



# M/s Sesa Environment Laboratory

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## Well Water Analysis Report

Mine Name: Suria Mine

Date of Sample collection : 20.02.2017

Standard method used for analysis: APHA Standard

Test Report No: 248

Date of Receipt of sample: 20.02.2017  
Analysis completion date: 25.02.2017

Parameter	Unit	Desirable Limit	Location				
			Mine Garage Well	Behind New Admin Office Well	Suria jetty Well	Suria Village Well	Khodgini Well
Colour	Hazen	<5.0	<5	<5	<5	<5	<5
pH	-	6.5-8.5	6.41	6.54	6.18	6.69	6.68
Turbidity	NTU	1.0	0.69	1	1	0.89	1.1
Conductivity	µs/cm	-	36	60	68	86	210
Dissolved Solids	mg/lit	500	18	30	34	43	105
Suspended Solids	mg/lit	-	1	1	2	1	2
Chloride	mg/lit	250	6.9	6.9	14.9	16.9	16.9
Total Hardness as CaCO3	mg/lit	200	10	20	16	20	52
Calcium as Ca++	mg/lit	75	2.4	4.8	4	4	16
Magnesium as mg++	mg/lit	30	1.0	1.9	1.5	2.4	2.9
Sulphate as SO4	mg/lit	200	3.0	4.8	3.2	6.1	18.0
Nitrate as NO3	mg/lit	45	0.1	0.1	0.1	0.1	0.1
Alkalinity	mg/lit	200	12	18	10	58	88
Iron as Fe	mg/lit	0.3	0.20	0.08	0.1	0.15	0.07
Manganese as Mn	mg/lit	0.1	0.01	0.06	0.03	0.03	0.01
MPN/100ml	mg/lit	Absent	Absent	Absent	21	13	17

Authorized Govt. Analyst

Laboratory Incharge



*[Signature]*



# M/s Sesa Environment Laboratory

Vedanta Limited, Mining Division, Codli Mines, P.O. Kirlapale, Goa-403727

Recognised by Ministry of Environment, Forests and Climate change, Govt. of India Vide Notification S.O.137(E).

Dated 12th January 2015, Valid up to 11.01.2020

\* Certified by ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007

## Surface water Analysis Report for the month of March 2017

Mine Name: Surla Mine

Date of Receipt of sample: 22.03.2017

Date of Sample collection: 22.03.2017

Analysis completion date : 28.03.2017

Standard method used for analysis: APHA Standard

Test Report No: 269

Parameter	Unit	Location				
		Permissible limits	Nallah water-Bhillem	Mine discharge to paddy fields	Upstream river Mandovi	Downstream river Mandovi
Colour	Hazen	---	<5	<5	<5	<5
pH	---	5.5 to 9.0	6.72	6.75	6.82	6.81
Turbidity	NTU	---	0.9	1.1	3.0	2.8
Dissolved Solids	mg/lit	---	64	36	15026	15008
Conductivity	µS/cm	---	128	72	30052	30016
Suspended Solids	mg/lit	100	2	2	3	3
Chlorides	mg/lit	---	8	7	7147	7047
Total Hardness as CaCO <sub>3</sub>	mg/lit	---	55	22	3737	3535
Calcium as Ca <sup>++</sup>	mg/lit	---	13	6	891	810
Magnesium as Mg <sup>++</sup>	mg/lit	---	5	2	368	368
Sulphate as SO <sub>4</sub>	mg/lit	---	2	3	1200	1125
Phosphate as PO <sub>4</sub>	mg/lit	5	0.1	BDL	0.5	0.5
Nitrate as NO <sub>3</sub>	mg/lit	10	BDL	BDL	0.8	0.6
B.O.D (3days, 27°C)	mg/lit	30	<3	<3	5.7	7.2
C.O.D	mg/lit	250	<10	<10	19	29
Total Iron	mg/lit	3	0.17	0.15	0.18	0.20
Manganese as Mn	mg/lit	2	0.07	0.06	0.08	0.08
D.O	mg/lit	---	7	7	7	6.3
Oil & Grease	mg/lit	10	Nil	<1	1.6	1.6

Note :- No water discharge from SMBP & SBP Tailing Pond to Nallah Water- Entry to Mine, Exit From Mine.

BDL- Below Detection Limit

Govt. Analyst



Laboratory Incharge



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dated 12<sup>th</sup> January 2015, Valid up to 11.01.2020

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## Well Water Level Report

Mine Name: Surla mine

Instrument Used: Well water tape

Sr.No	Location	Total Depth of well in mtr	Depth of Water level from the reference point in mtr	Water Column in mtr
			22.03.2017	
1	Well Suria Jetty	7.08	5.5	1.58
2	Well Khodgini	6.9	6.1	0.8
3	Well Near Mine Garage Office	7.5	6.2	1.3
4	Well suria Village	6.16	4.4	1.76
5	Well behind New Admin Office	7.2	5.8	1.4

Govt Analyst

Laboratory Incharge





# M/s Sesa Environment Laboratory

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## Well Water Analysis Report

Mine Name: Surla Mine

Date of Sample collection : 22.03.2017

Standard method used for analysis: APHA Standard

Test Report No: 270

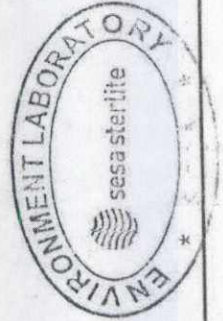
Date of Receipt of sample: 22.03.2017

Analysis completion date: 28.03.2017

Parameter	Unit	Permissible Limit	Location			
			Mine Garage Well	Behind New Admin Office Well	Surla jetty Well	Surla Village Well
Colour	Hazen	<5.0	<5	<5	<5	<5
pH	-	6.5-8.5	6.48	6.53	6.23	6.61
Turbidity	NTU	5	1	1.4	1	0.9
Conductivity	µs/cm	-	40	64	72	80
Dissolved Solids	mg/lit	500	20	32	36	40
Suspended Solids	mg/lit	-	1	2	1	2
Chloride	mg/lit	250	7	7	17	17
Total Hardness as CaCO3	mg/lit	200	10	22	18	22
Calcium as Ca++	mg/lit	75	2.4	4.9	4.0	4.9
Magnesium as mg++	mg/lit	30	1.0	2.5	2.0	2.5
Sulphate as SO4	mg/lit	200	2	3	1	2
Nitrate as NO3	mg/lit	45	0.1	0.1	0.1	0.1
Alkalinity	mg/lit	200	14	19	10	26
Iron as Fe	mg/lit	0.3	0.08	0.06	0.08	0.06
Manganese as Mn	mg/lit	0.1	0.03	0.02	0.04	0.02
MPN/100ml	mg/lit	Absent	10	12	10	10

BDL- Below Detection Limit

Govt. Analyst



f. Sharma

Laboratory Incharge



**M/s Sesa Environment Laboratory**

Vedanta Limited, Mining Division, Corli Mines, P.O. Kirlapale, Goa-403727

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**Surface water Analysis Report for the month of October 2016**

Date of Receipt of sample: 20.10.2016  
Analysis completion date : 27.10.2016

Mine Name: Suria Mine  
Date of Sample collection: 20.10.2016  
Standard method used for analysis: APHA Standard  
Test Report No: 187

Parameter	Unit	Location						Upstream river Mandovi	Downstream river Mandovi
		Permissible limits	Nallah water- Bhillem	Sonshi Nallah Water- Entry to Mine	Sonshi Nallah water- Exit from Mine	Mine discharge to paddy fields			
Colour	Hazen	---	9	7	8	6	8	6	
pH	---	5.5 to 9.0	6.51	6.32	6.26	6.62	6.68	6.64	
Turbidity	NTU	---	3.2	0.9	0.9	2.4	2.0	2.3	
Dissolved Solids	mg/lit	---	32	23	25	28	77	79	
Conductivity	$\mu$ S/cm	---	65	46	50	56	154	158	
Suspended Solids	mg/lit	100	4	4	3	3	4	3	
Chlorides	mg/lit	---	7	5	5	5	28	30	
Total Hardness as $\text{CaCO}_3$	mg/lit	---	26	18	20	22	32	34	
Calcium as $\text{Ca}^{++}$	mg/lit	---	6.4	4.0	4.0	4.8	7.2	8.0	
Magnesium as $\text{Mg}^{++}$	mg/lit	---	2.4	1.9	2.4	2.4	3.4	3.4	
Sulphate as $\text{SO}_4$	mg/lit	5	1	0.8	0.6	1.7	15.3	15.5	
Phosphate as $\text{PO}_4$	mg/lit	10	0.1	BDL	BDL	BDL	0.1	0.1	
Nitrate as $\text{NO}_3$	mg/lit	30	BDL	BDL	BDL	BDL	0.1	0.1	
B.O.D (3days, 27°C)	mg/lit	250	<3	<3	<3	<3	4.1	4.6	
C.O.D	mg/lit	3	<10	<10	<10	<10	19	19	
Total Iron	mg/lit	2	0.06	BDL	BDL	BDL	0.08	0.10	
Manganese as Mn	mg/lit	---	BDL	BDL	BDL	BDL	0.03	0.05	
D.O	mg/lit	10	7	7	7.1	7	7	6.7	
Oil & Grease	mg/lit	---	1	<1	<1	<1	1.2	1.1	

Note :- No water discharge from SMBP & SBP Tailing Pond.

BDL- Below Detection Limit

Govt. Analyst



Laboratory Incharge



# M/s Sesa Environment Laboratory

Vedanta Limited, Mining Division, Godli Mines, P.O. Kirlapale, Goa-403727

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## Well Water Analysis Report

Mine Name: Surla Mine

Date of Sample collection : 20.10.2016

Standard method used for analysis: APHA Standard

Test Report No: 188

Date of Receipt of sample: 20.10.2016

Analysis completion date: 27.10.2016

Parameter	Unit	Permissible Limit	Location			
			Mine Garage Well	Behind New Admin Office Well	Surla jetty Well	Surla Village Well
Colour	Hazen	<5.0	<5	<5	<5	<5
pH	-	6.5-8.5	6.52	6.5	6.53	6.50
Turbidity	NTU	5	0.8	1.5	1.1	1.7
Conductivity	µs/cm	-	37	82	68	48
Dissolved Solids	mg/lit	500	18	41	34	24
Suspended Solids	mg/lit	-	2	2	2	2
Chloride	mg/lit	250	4	14	13	11
Total Hardness as CaCO <sub>3</sub>	mg/lit	200	10	18	16	10
Calcium as Ca++	mg/lit	75	2.4	4.8	4.0	3.2
Magnesium as mg++	mg/lit	30	1.0	1.5	1.5	0.5
Sulphate as SO <sub>4</sub>	mg/lit	200	3.9	6.4	3.8	3.9
Nitrate as NO <sub>3</sub>	mg/lit	45	BDL	0.1	BDL	BDL
Alkalinity	mg/lit	200	21	27	20	27
Iron as Fe	mg/lit	0.3	0.03	BDL	0.04	0.08
Manganese as Mn	mg/lit	0.1	BDL	BDL	BDL	0.03
MPN/100ml	-	Absent	4	Absent	10	10
						6

BDL- Below Detection Limit

Govt. Analyst



for  
Laboratory Incharge



### M/s Sesa Environment Laboratory

Vedanta Limited, Mining Division, Godi Mines, P.O. Kirtlapate, Goa-403727

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#### Well Water level Report

Mine Name: Surta mine

Instrument Used: Well water tape

Sr.No	Location	Total Depth of well in mtr	Depth of Water level from the reference point in mtr		Water Column in mtr
			20.10.2016		
1	Well Surta Jetty	7.08	3.2		3.9
2	Well Khodgini	6.9	5.0		1.9
3	Well Near Mine Garage Office	7.5	3.9		3.6
4	Well surta Village	6.16	1.3		4.9
5	Well behind New Admin Office	7.2	4.0		3.2

Govt Analyst

for *[Signature]*  
Laboratory Incharge





## M/s Sesa Environment Laboratory

Vedanta Limited, Mining Division, Codli Mines, P.O. Kirlapale, Goa-403727

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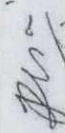
### Well Water level Report

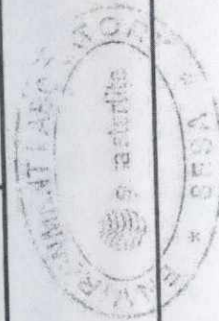
Instrument Used: Well water tape

Mine Name: Surla mine

Sr.No	Location	Total Depth of well in mtr	Depth of Water level from the reference point in mtr	Water Column in mtr
			26.11.2016	
1	Well Surla Jetty	7.08	4.03	3.1
2	Well Khodgini	6.9	5.7	1.2
3	Well Near Mine Garage Office	7.5	5.1	2.4
4	Well surla Village	6.16	3.1	3.1
5	Well behind New Admin Office	7.2	4.53	2.7

  
Govt Analyst

  
Laboratory Incharge





# M/s Sesa Environment Laboratory

Vedanta Limited, Mining Division, Codd Mines, P.O. Kirlapale, Goa-403727  
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## Well Water Analysis Report

Mine Name: Surla Mine

Date of Sample collection : 26.11.2016

Standard method used for analysis: APHA Standard

Test Report No: 206

Date of Receipt of sample: 26.11.2016  
Analysis completion date: 02.12.2016

Parameter	Unit	Permissible Limit	Location				
			Mine Garage Well	Behind New Admin Office Well	Surla Jetty Well	Surla Village Well	Khodgini Well
Colour	Hazen	<5.0	<5	<5	<5	6.63	6.59
pH	NTU	6.5-8.5	6.54	6.59	6.55	1.1	1.0
Turbidity	µs/cm	5	0.8	1.0	1.2	56	240
Conductivity	mg/lit	500	40	86	68	28	120
Dissolved Solids	mg/lit	-	20	43	34	2	2
Suspended Solids	mg/lit	250	6	16	13	12	16
Chloride	mg/lit	200	12	24	20	10	70
Total Hardness as CaCO3	mg/lit	75	2.4	6.4	4.8	3.2	19.2
Calcium as Ca++	mg/lit	30	1.5	1.9	1.9	0.5	5.4
Magnesium as mg++	mg/lit	200	2.0	2.1	2.0	3.0	20.4
Sulphate as SO4	mg/lit	45	BDL	BDL	BDL	BDL	BDL
Nitrate as NO3	mg/lit	200	22	30	20	26	140
Alkalinity	mg/lit	0.3	0.08	0.05	0.06	0.08	0.08
Iron as Fe	mg/lit	0.1	0.03	BDL	BDL	0.04	0.02
Manganese as Mn	mg/lit	Absent	Absent	10	26	31	33
MPN/100ml	-	-	-	-	-	-	-

BDL- Below Detection Limit

Govt. Analyst



*[Signature]*  
Laboratory Incharge



**Surface water Analysis Report for the month of November 2016**

Date of Receipt of sample: 26.11.2016  
Analysis completion date : 02.12.2016

Mine Name: Surla Mine  
Date of Sample collection: 26.11.2016  
Standard method used for analysis: APHA Standard  
Test Report No: 205

Parameter	Unit	Permissible limits	Location					Upstream river Mandovi	Downstream river Mandovi
			Nallah water- Bhillem	Sonshi Nallah Water- Entry to Mine	Sonshi Nallah water- Exit from Mine	Mine discharge to paddy fields			
Colour	Hazen	----	<5	<5	<5	<5	<5	<5	<5
pH	----	5.5 to 9.0	6.46	6.3	6.3	6.53	6.71	6.70	
Turbidity	NTU	----	1.3	1.0	0.9	1.4	2.0	2.6	
Dissolved Solids	mg/lit	----	32	25	26	28	83	79	
Conductivity	µS/cm	----	64	50	52	56	166	158	
Suspended Solids	mg/lit	100	2	2	2	2	3	3	
Chlorides	mg/lit	----	6	6	5	5	36	30	
Total Hardness as CaCO <sub>3</sub>	mg/lit	----	26	20	20	24	34	34	
Calcium as Ca <sup>++</sup>	mg/lit	----	6.4	4.8	4.8	4.8	8.0	8.0	
Magnesium as Mg <sup>++</sup>	mg/lit	----	2.4	1.9	1.9	2.9	3.4	3.4	
Sulphate as SO <sub>4</sub>	mg/lit	----	1	1	0.8	1.6	16.0	15.5	
Phosphate as PO <sub>4</sub>	mg/lit	5	0.1	0.1	0.1	BDL	0.1	0.1	
Nitrate as NO <sub>3</sub>	mg/lit	10	BDL	BDL	BDL	BDL	0.1	0.1	
B.O.D (3days, 27°C)	mg/lit	30	<3	<3	<3	<3	4	4.6	
C.O.D	mg/lit	250	<10	<10	<10	<10	18	18	
Total Iron	mg/lit	3	0.09	1	0.08	0.09	0.1	0.12	
Manganese as Mn	mg/lit	2	0.02	0.06	0.04	0.04	0.04	0.04	
D.O	mg/lit	----	7	7	7	7	7	6.7	
Oil & Grease	mg/lit	10	<1	<1	<1	<1	1.2	1	

Note :- No water discharge from SMBP & SBP Tailing Pond.  
BDL- Below Detection Limit

Govt. Analyst

Laboratory Incharge



## M/s Sesa Environment Laboratory

Vedanta Limited, Mining Division, Codli Mines, P.O. Kirlapale, Goa-403727

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### Well Water level Report

Instrument Used: Well water tape

Mine Name: Surla Mine

Sr.No	Location	Total Depth of well in mtr	Depth of Water level from the reference point in mtr	Water Column in mtr
			24.12.2016	
1	Well Surla Jetty	7.08	4.9	2.2
2	Well Khodgini	6.9	5.85	1.1
3	Well Near Mine Garage Office	7.5	5.5	2.0
4	Well surla Village	6.16	3.1	3.1
5	Well behind New Admin Office	7.2	5	2.2



*f. Sharma*  
Laboratory Incharge

*Govt Analyst*  
Govt Analyst



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\* Certified by ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007

# Well Water Analysis Report

Mine Name: Surla Mine  
Date of Sample collection : 24.12.2016  
Standard method used for analysis: APHA Standard  
Test Report No: 214

Date of Receipt of sample: 24.12.2016  
Analysis completion date: 31.12.2016

Parameter	Unit	Permissible Limit	Location				
			Mine Garage Well	Behind New Admin Office Well	Surla Jetty Well	Surla Village Well	Khodgini Well
Colour	Hazen	<5.0	<5	<5	<5	<5	<5
pH	-	6.5-8.5	6.26	6.56	6.22	6.51	6.7
Turbidity	NTU	5	0.9	0.8	0.9	1.0	1.0
Conductivity	us/cm	-	32	52	68	93	200
Dissolved Solids	mg/lit	500	16	26	34	47	100
Suspended Solids	mg/lit	-	2	2	2	2	2
Chloride	mg/lit	250	4	7	14	17	14
Total Hardness as CaCO3	mg/lit	200	10	24	12	18	70
Calcium as Ca++	mg/lit	75	3.2	6.4	4.0	4.0	16.8
Magnesium as mg++	mg/lit	30	0.5	1.9	0.5	1.9	6.8
Sulphate as SO4	mg/lit	200	2.1	0.6	3.0	3.0	19.6
Nitrate as NO3	mg/lit	45	BDL	BDL	BDL	0.1	BDL
Alkalinity	mg/lit	200	25	26	16	30	131
Iron as Fe	mg/lit	0.3	0.06	0.08	0.10	0.07	0.07
Manganese as Mn	mg/lit	0.1	0.03	BDL	0.03	0.04	0.03
MPN/100ml	-	Absent	Absent	8.3	31	31	25

BDL- Below Detection Limit

Govt. Analyst



f. *[Signature]*  
Laboratory Incharge



**M/s Sesa Environment Laboratory**

Vedanta Limited, Mining Division, Codli Mines, P.O. Kirlapale, Goa-403727

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**Surface water Analysis Report for the month of December 2016**

Mine Name: Surla Mine

Date of Sample collection: 24.12.2016

Standard method used for analysis: APHA Standard

Test Report No: 213

Date of Receipt of sample: 24.12.2016  
Analysis completion date : 31.12.2016


Parameter	Unit	Permissible limits	Location					Upstream river Mandovi	Downstream river Mandovi
			Nallah water- Bhilleim	Sonshi Nallah Water- Entry to Mine	Sonshi Nallah water- Exit from Mine	Mine discharge to paddy fields			
Colour	Hazen	----	<5	<5	<5	<5	<5	<5	<5
pH	----	5.5 to 9.0	6.51	6.56	6.48	6.53	7.15	7.15	6.98
Turbidity	NTU	----	0.9	1.0	0.9	1.4	2.3	2.3	2.4
Dissolved Solids	mg/lit	----	54	26	26	29	7750	7750	7861
Conductivity	µS/cm	----	108	52	52	58	15530	15530	15722
Suspended Solids	mg/lit	100	2	2	2	2	3	3	3
Chlorides	mg/lit	----	7	7	7	7	4892	4892	4990
Total Hardness as CaCO <sub>3</sub>	mg/lit	----	48	22	20	20	1700	1700	1800
Calcium as Ca <sup>++</sup>	mg/lit	----	12	4	4	4	160	160	160
Magnesium as Mg <sup>++</sup>	mg/lit	----	4.4	2.9	2.4	2.4	315.9	315.9	340
Sulphate as SO <sub>4</sub>	mg/lit	----	1.3	1.6	0.8	1.6	350.0	350.0	400.0
Phosphate as PO <sub>4</sub>	mg/lit	5	0.1	0.1	0.1	BDL	0.1	0.1	0.1
Nitrate as NO <sub>3</sub>	mg/lit	10	BDL	BDL	BDL	BDL	0.2	0.2	0.6
B.O.D (3days, 27°C)	mg/lit	30	<3	<3	<3	<3	4	4	4.6
C.O.D	mg/lit	250	<10	<10	<10	<10	18	18	28
Total Iron	mg/lit	3	0.09	0.16	0.10	0.11	0.16	0.16	0.15
Manganese as Mn	mg/lit	2	0.04	0.06	0.05	0.04	0.05	0.05	0.05
D.O	mg/lit	----	7	7	7	7	7	7	7
Oil & Grease	mg/lit	10	<1	<1	<1	1	1.6	1.6	1.4

Note :- No water discharge from SMBP & SBP Tailing Pond.

BDL- Below Detection Limit

  
Govt. Analyst

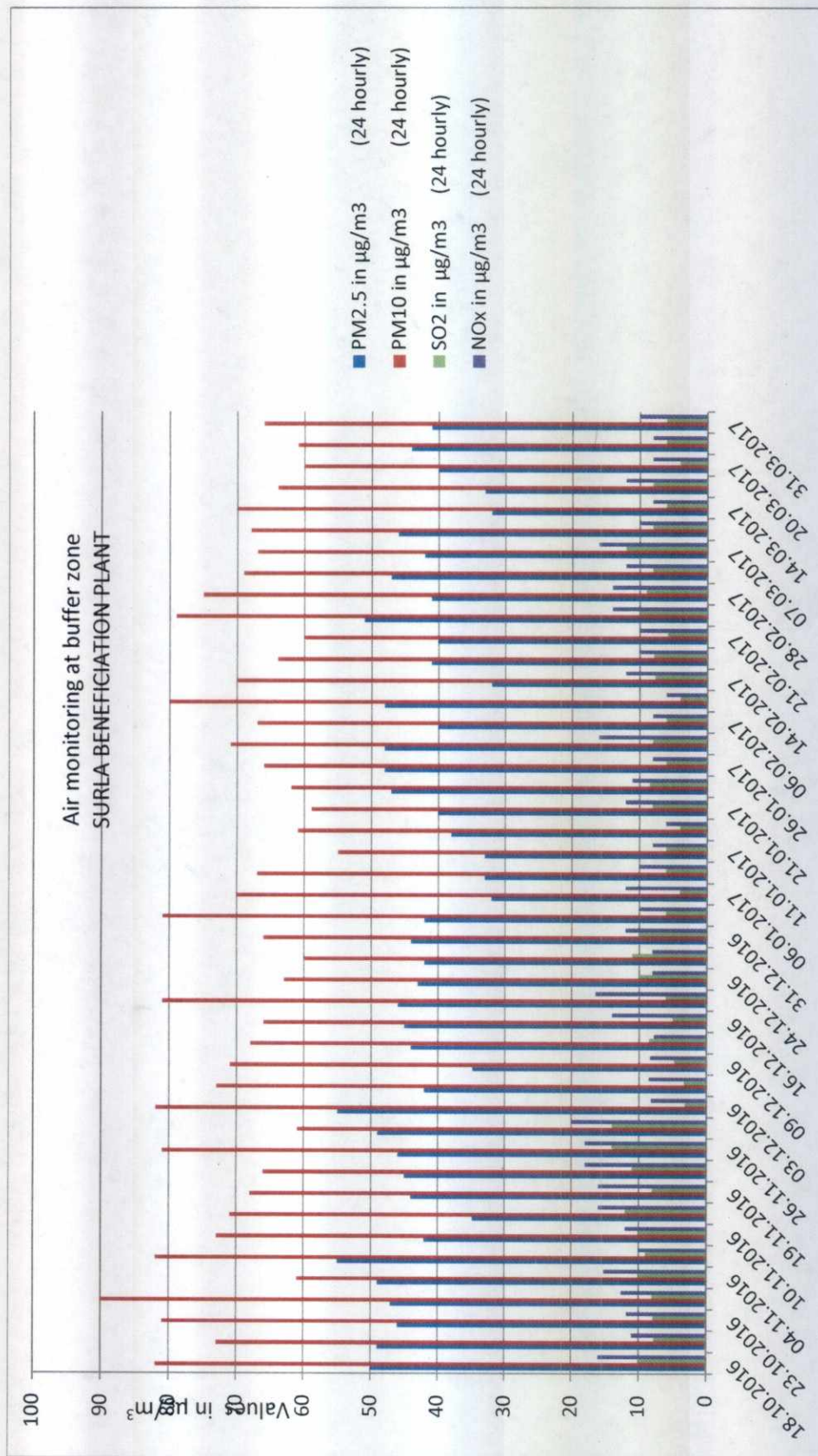


  
Laboratory Incharge



# Ambient Air Quality Monitoring Report

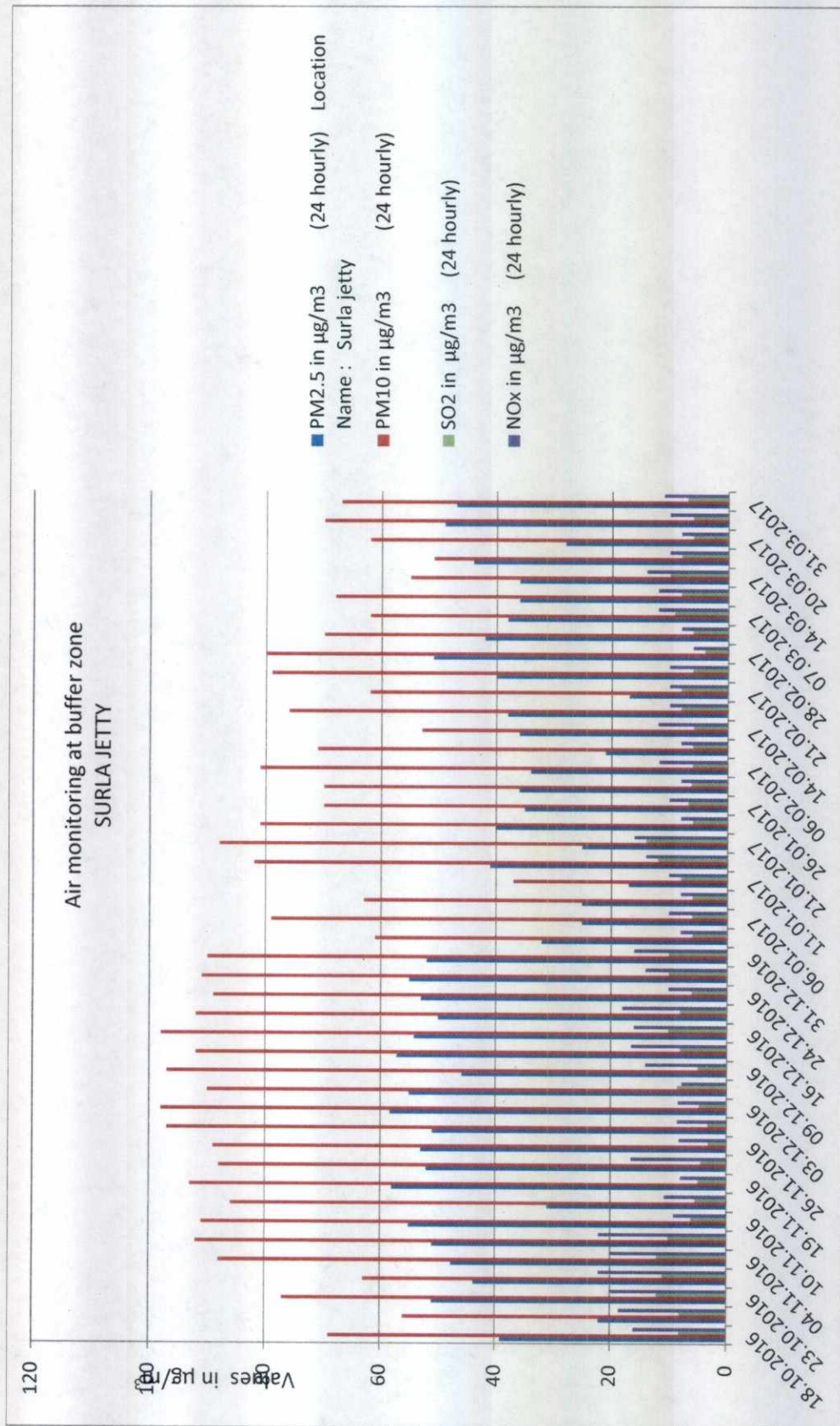
## Surla Sonshi Iron Ore Mine





# Ambient Air Quality Monitoring Report

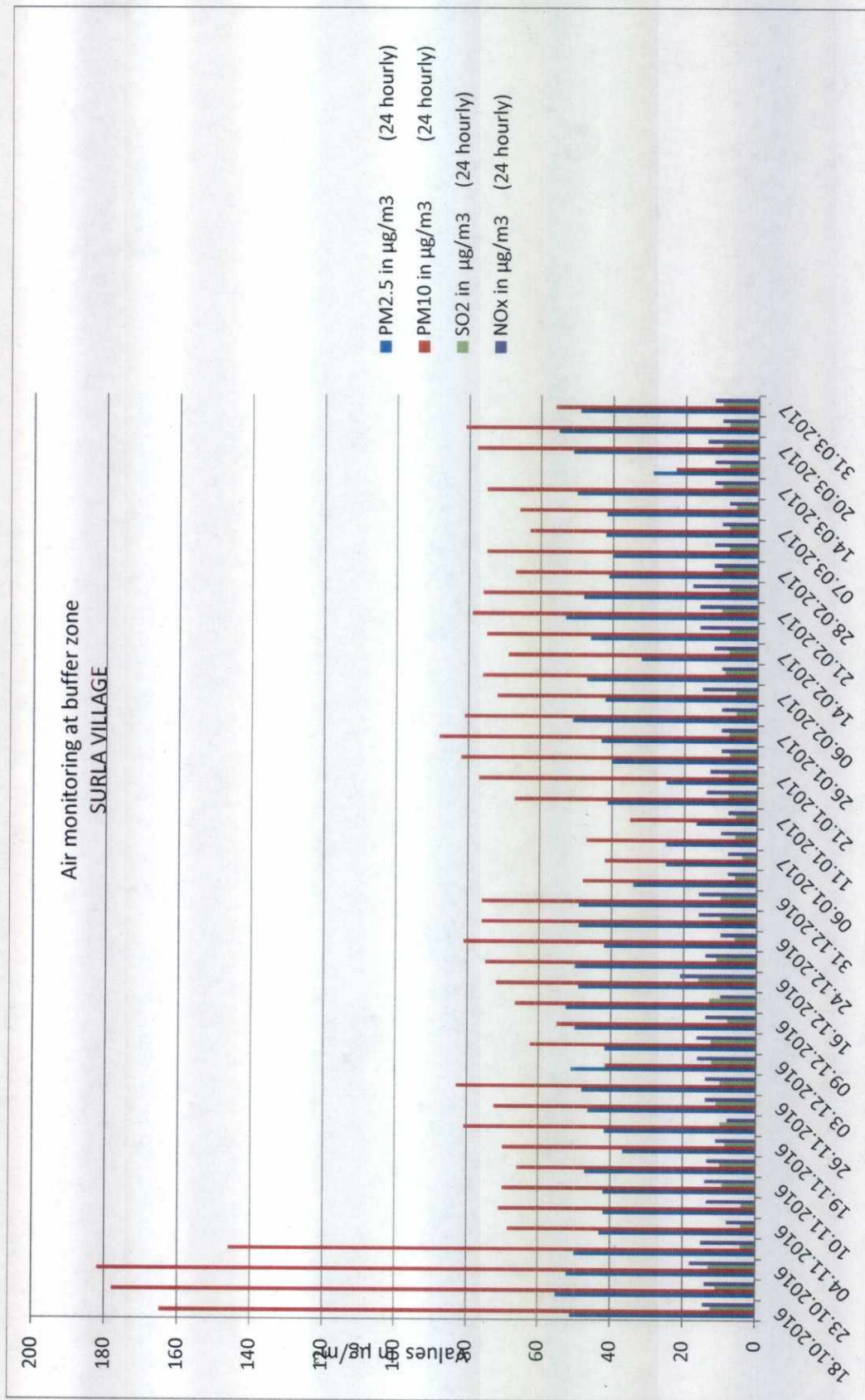
## Surla Sonshi Iron Ore Mine





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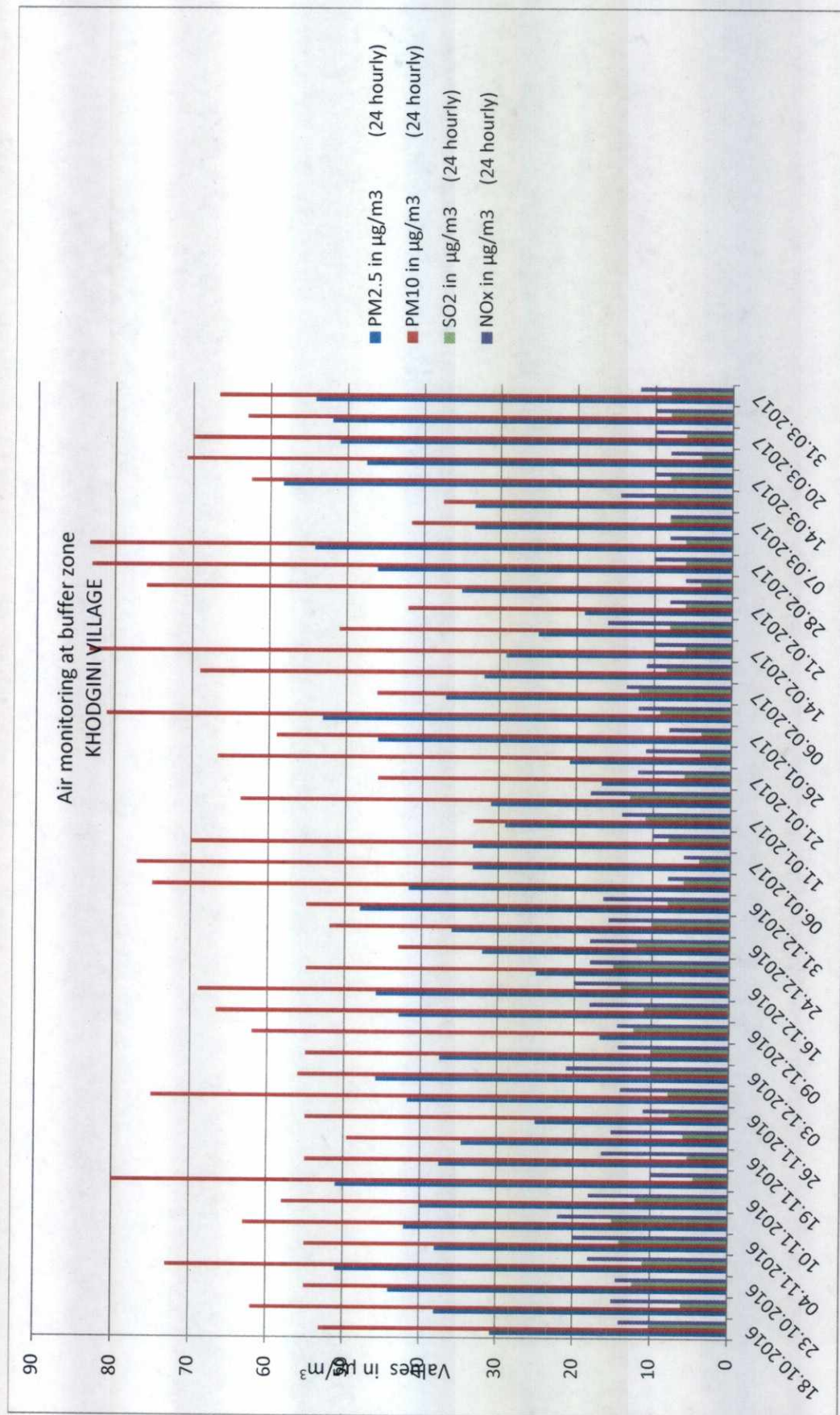
## Surla Sonshi Iron Ore Mine





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