

To

26-05-2017

Additional Director (South)
Ministry of Environment & Forest
Regional Office (Southern Zone)
Kandriya Sadan, IVth Floor, E & F Wings,
17th Main Road, II Block Koramangala,
Bangalore-560034

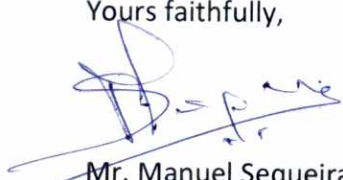
Sub: Six monthly compliance report of Sanquelim group of Iron Ore Mines (T.C. No. 3/54, 9/49, 10/49), Goa for the period October 2016 to March 2017.

Respected Sir,

We are herewith submitting the condition wise compliance report as per the conditions and their corresponding annexures and CD laid down in the Environmental Clearance Letter No: J-11015/28/2006-IA.II(M) dated 06/07/2007 for the period **October 2016 to March 2017.**

Thanking you,

Yours faithfully,



Mr. Manuel Sequeira
Mines Manager
Sanquelim Group of Mines.

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

C.C – Member Secretary, Goa State Pollution Control Board

-- CGWB

VEDANTA LIMITED

Sesa Goa iron ore: Sesa Ghor, 20 EDC Complex, Patto, Panjim, Goa – 403 001, India
T +91 0832 2460600 | Website: www.sesagoaironore.com

Registered Office: Vedanta Limited, 1st Floor, 'C' wing, Unit 103, Corporate Avenue, Atul Projects, Chakala, Andheri (East), Mumbai 400093, Maharashtra, India.
CIN: L13209MH1965PLC291394

Compliance report to conditions of Environmental Clearance issued by

Ministry of Environment & Forests, Govt. of India, for Sankelmin Group of Mines (T.C. No.9 of 1949, 10 of 1949 & 3 of 1954)

Letter No. J-11015/28/2006-IA.II(M) dated 6th July 2007

Production: 0.2 MTPA as per Environment clearance, however the production limit 0.09 MTPA as per capping imposed by state government and redistributed production limit to 0.2 MTPA in December 2016

Period – October 2016 to March 2017

S. No	Condition of clearance	Status of compliance	Remarks
A.	Specific Conditions		
(I)	All the conditions stipulated by the State Pollution Control Board in their NOC should be effectively implemented.	All the conditions are effectively implemented	
(ii)	Topsoil, if any shall be stacked properly with proper slope with adequate safeguards and should be used for reclamation and rehabilitation on mined out areas.	There is no topsoil within area utilized for mining operations.	
(iii)	There shall be no new external over burden dump created.	Dumping of waste would be in accordance of approved mining plan.	
(iv)	The existing over burden should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas use of geo textiles shall be undertaken for stabilization of dumps. Monitoring and management of rehabilitated areas should be submitted to the Ministry of Environment & Forests on six monthly basis.	Sankelmin mine is scientifically vegetated by horticultural methods around the dump slopes. The best reclamation and rehabilitation practices are in place.	A detailed biodiversity management plan is being prepared in association with CEE.

(v)	Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected should be utilized for watering the mine area, roads, green belt development etc. The drains should be regularly desilted particularly after monsoon and maintained properly. Garland drain (size, gradient and length) shall be constructed for both mine pit and for waste dump and sump capacity should be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) 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 and desilted at regular intervals.	Mine and dump runoff is channelized into the working pit through the garland drains. There is no discharge outside mining lease.	.
(vi)	Drilling and blasting shall not be undertaken.	Drilling and blasting are not carried out in the mine.	
(vii)	Plantation shall be raised in an area of 132.058 ha including green belt of adequate width by planting the native species around the ML area, roads, reclaimed area etc. in consultation with the local DFO / Agriculture Department. The density of the trees should be around 2000 plants per ha.	Thick dense plantation is done all along the mining lease area, dump slopes. Both native and local species are planted by adapting horticultural method of vegetation.	A detailed biodiversity management plan is being prepared in association with CEE.
(viii)	The project authority should implement suitable conservation measures to augment ground water resources in area in consultation with the Regional Director, Central Ground Water Board.	Mining pits are utilized for harvesting the rain water. The rain water harvested in mining pit is utilized for the dust suppression, vehicle washing etc.	Rain water accumulated in the mining pit is used for the dust suppression and rehabilitation purpose.

(ix)	Regular monitoring of ground water level and quality should be carried out by establishing a network of existing wells and construction of new piezometers during the mining operation. The monitoring should be carried out four times in a year - Pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and data thus collected may be sent regularly to MOEF, Central Ground Water Authority and Regional Director Central Ground Water Board..	Monitoring of Ground water level and Quality is carried out and the results are submitted to Central Ground Water Authority, Regional Director Central Ground Water Board, GSPCB and Ministry.	Water Monitoring Results is attached as Annexure- 1
(x)	Prior permission from the competent authority should be obtained for withdrawal of ground water if any required for project.	Permission from the Competent Authority Obtained.	Permission from WRD for pumping water from Mine pit is obtained for Sanguelim Mine via registration certificate No. R-12/MIN/05/16 dated 05/12/2016.
(xi)	Vehicular emission should be kept under control and regularly monitored. Measure shall be taken for maintainance of vehicles used in mining operations and in transportation of minerals. The vehicles should be covered with a tarpaulin and shall not be overloaded.	Preventive maintenance is carried out at regular intervals for all the HEMMs used for the mining operations. All the ore carrying trucks are covered with tarpaulin before leaving the mining premises. Free board is provided & load is kept within the limits.	Vehicle emission records are maintained & renewed regularly
(xii)	Consent to operate should be obtained from SPCB before starting production from mine.	The consents were regularly renewed. The recent consent to operate has been received on 07/09/2015 letter no. 5/8458/15-PCB/CI-550 and is valid till 19/05/2017.	

(xiii)	Sewage treatment plant should be installed for the colony. ETP should also be provided for workshop and wastewater generated from mining operations.	There is no colony and work shop with in the mining lease. Sesa technical school and Sesa football Academy which are within the mining lease are provided with soak pits	
(xiv)	The voids created at the end of the mining shall be converted in to water body with shallow depths not exceeding 30m. The higher benches of the excavated voids /mine pit shall be terraced and plantation done to stabilise the slopes. Peripheral fencing shall be done along the excavated area.	Will be complied with.	
(xv)	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.	

S. No	Condition of Clearance	Status of Compliance	Remarks
A	General Conditions		
(i)	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forest.	Mining is being carried out as per mining plan approved by Indian Bureau of Mines	
(ii)	No change in the calendar plan including excavation, quantum of mineral iron ore and waste should be made.	Production & waste generation is being carried out in accordance with Mining plan approved by Indian Bureau of Mines.	
(iii)	Conservation measures for protection of flora and fauna in the core and buffer zone should be drawn up in consultation with local forest and wildlife department.	Conservation measures are taken up in consultation with forest department.	
(iv)	Four ambient air quality - monitoring stations should be established in core zone as well as buffer zone for RPM, SPM, SO ₂ , NO _x monitoring. Location of the stations should be decided on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.	Complied. Air monitoring stations are fixed within the core & buffer zone and monitored as per new Mining standards in core zone and NAAQ in buffer zone at the in-house environment laboratory approved by MOEF.	Graphical Representation of the Air Monitoring results is attached as Annexure 1.

(v)	Data on ambient air quality (RPM, SPM, SO ₂ , NO _x) should be regularly submitted to the ministry including its Regional office located at Bangalore and the State Pollution Control Board / Central Pollution Control Board once in six months.	Monitoring for Ambient Air Quality is carried out twice a week as per guidelines stipulated under Consent to Operate and the results are submitted to Ministry and GSPCB on regular basis.	Graphical Representation of the Air Monitoring results is attached as Annexure 1.
(vi)	Fugitive dust emission from all the sources should be controlled regularly. Water spraying arrangement on haul road, loading and unloading and at transfer points should be provided and properly maintained.	For the control of the fugitive dust, various possible measures are adopted some of which are as below: (a) To control the dust, dumps are covered with lateritic waste, and afforested with plants/ grasses species, which helps in minimizing the fugitive dust (b) Water sprinkling is carried out to prevent the dust from getting air borne.	

(vii)	Measures should be taken for control of noise levels below 85 dBA in work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.	Is being complied. Measures are being taken for the control of noise level in the work environment. Workers engaged in operation of HEMM, etc are provided with ear plugs / muffs. Monitoring has been stopped after the suspension of mining operation and will be resume once the operation starts.	Most of the HEMM are with A/C cabins which minimize the impact of noise on operator. Other than this where ever the noise is high, the protective equipment's are provided to the operators.
(viii)	Industrial waste water (workshop and waste from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSP 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. Oil and greases trap should be installed before discharge of workshop effluents.	There is no discharge from the mines.	
(ix)	Personal 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 program of workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.	Is being followed. Personal working in dusty area wear protective respiratory device and they are provided with adequate training and information on safety and health. Also personal dust monitoring is carried out.	Dust mask are provided to the personnel exposed to dusty conditions. HR department as well as the shift supervisors provide on the job training regularly. Health surveillance programme of workers is undertaken periodically by our company's Doctor.

3	The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further conditions in the interest of environment protection		
4	Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provision of Environment (Protection) Act, 1986.		
5	The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability insurance Act, 1991 along with their amendments and rules.		

(x)	A separate environmental management cell with suitable qualified personnel should be set -up under the control of Senior Executive, who will report directly to the Head of the Organization.	Is complied with, environment cell is established with multidisciplinary staff which directly reports to the CEO of the company.		
(xi)	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.	Shall be communicated in time		
(xii)	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bangalore.	Funds are separately earmarked under various heads like Mine reclamation, Erosion control, Environment monitoring, Water treatment, dust suppression etc.	Purpose	Expenditure in Rs.
			General Expenditure	16,550.00
			Mine reclamation	1,346,390.00
			Erosion control	547,715.33
			—dust suppression	600,542.48
			2,511,197.81	

(xiii)	The regional office of the Ministry located at Bangalore shall monitor compliance of the stipulated conditions. The project authorities should extend full co-operation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.	Necessary support shall be provided to the regional officer for the visit, furnishing requisite data etc.	
(xiv)	A copy of clearance letter will be marked to concerned Panchayat / local NGO, if any, from whom and suggestion / representation has been received while processing the proposal.	Clearance letter has been already given to local panchayat.	
(xv)	State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Center and collector's office /Tehsildar's Office for 30 days.	Final mine closure plan approved by IBM would be submitted to MOEF in due course of time in accordance with Rule 23(c) of MCDDR 1988.	
(xvi)	The project authorities should advertise at least in two local newspapers widely circulated, one which shall be in the vernacular language of the locality concerned, within 7 days of the issue 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 also at web site of the Ministry of Environment and Forest at http:// envfor.nic.in and a copy of the same should be forwarded to the Regional Office of this Ministry located Bangalore.	Copy of advertisement of the Environment Clearance letter in two local newspapers has been done on 16/07/2007	

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, valid up to 11.01.2020

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

Well Water Analysis Report

Mine Name: Sanquelim Mine

Date of Receipt of sample: 17.01.2017

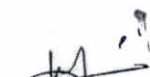
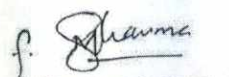
Date of Sample collection :17.01.2017

Analysis completion date:25.01.2017

Standard method used for analysis: APHA Standard

Test Report No: 224

Parameter	Unit	Permissible Limit	Location	
			Sesa Football Academy Well	Virdi Village Well
Colour	Hazen	<5.0	<5	<5
pH	-	6.5-8.5	6.39	6.65
Turbidity	NTU	5	0.92	1
Conductivity	µs/cm	-	520	42.4
Dissolved Solids	mg/lit	500	273	21.2
Suspended Solids	mg/lit	-	2	2
Chloride	mg/lit	250	7.9	6.8
Total Hardness as CaCO ₃	mg/lit	200	32.0	40
Calcium as Ca ⁺⁺	mg/lit	75	5.6	5.6
Magnesium as mg ⁺⁺	mg/lit	30	4.4	6.32
Sulphate as SO ₄	mg/lit	200	1.1	1.2
Nitrate as NO ₃	mg/lit	45	0.2	0.2
Alkalinity	mg/lit	200	18	21
Iron as Fe	mg/lit	0.3	0.22	0.18
Manganese as Mn	mg/lit	0.1	0.04	0.05
MPN/100ml	mg/lit	Absent	Absent	13


Govt. Analyst
Laboratory Incharge

M/s Sesa Environment Laboratory

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

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January 2015 , Valid up to 11.01.2020

dated 12th


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

Well water level Report


Mine Name: Sanquelim 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	Virdi Village-Well	16	11.8	4.2
2	Football Academy	5.9	3.2	2.7
3	Market -Well	5.25	3.2	2.05


Govt Analyst




Laboratory Incharge

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

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Surface Water Analysis Report for the Month of January 2017

Mine Name: Sanquelim Mine

Date of Sample collection: 18.01.2017

Standard method used for analysis: APHA Standard

Test Report No: 226

Date of Receipt of sample: 18.01.2017

Analysis completion date : 27.01.2017

Parameter	Unit	Location		
		Permissible limits	Upstream Gauthona River	Downstream Gauthona River
Colour	Hazen	----	<5	<5
PH	----	5.5 to 9.0	6.84	6.9
Turbidity	NTU	----	1.0	0.9
Dissolved Solids	mg/lit	----	39	48
Conductivity	μ S/cm	----	80	91
T.S.S	mg/lit	100	2	2
Chlorides	mg/lit	----	7	7
Total Hardness as CaCO ₃	mg/lit	----	40	38
Calcium as Ca ⁺⁺	mg/lit	----	9.6	8.0
Magnesium as Mg ⁺⁺	mg/lit	----	3.9	4.4
Sulphate as SO ₄	mg/lit	----	2.1	2.1
Phosphate	mg/lit	5	BDL	BDL
Nitrate as NO ₃	mg/lit	10	0.1	0.1
B.O.D (3days, 27°C)	mg/lit	30	<3	<3
C.O.D	mg/lit	250	<10	<10
Fe	mg/lit	3	0.12	0.13
Mn	mg/lit	2	0.08	0.05
D.O	mg/lit	----	7	7
Oil & Grease	mg/lit	10	<1	<1

Note :- No Water Discharge from Mine

BDL- Below Detection Limit


Govt. Analystfor 
Laboratory Incharge

M/s Sesa Environment Laboratory

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Surface Water Analysis Report for the Month of February 2017

Mine Name: Sanquelim Mine

Date of Sample collection: 22.02.2017

Standard method used for analysis: APHA Standard

Test Report No: 253

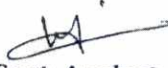
Date of Receipt of sample: 22.02.2017

Analysis completion date : 27.02.2017


Parameter	Unit	Location		
		Permissible limits	Upstream Gauthona River	Downstream Gauthona River
Colour	Hazen	----	<5	<5
PH	----	5.5 to 9.0	6.76	6.81
Turbidity	NTU	----	1.0	0.9
Dissolved Solids	mg/lit	----	45	48
Conductivity	μS/cm	----	90	91
T.S.S	mg/lit	100	2	2
Chlorides	mg/lit	----	7	7
Total Hardness as CaCO ₃	mg/lit	----	40	40
Calcium as Ca ⁺⁺	mg/lit	----	9.6	8.8
Magnesium as Mg ⁺⁺	mg/lit	----	3.9	4.4
Sulphate as SO ₄	mg/lit	----	2.3	2.1
Phosphate	mg/lit	5	BDL	BDL
Nitrate as NO ₃	mg/lit	10	0.1	0.1
B.O.D (3days, 27°c)	mg/lit	30	<3	<3
C.O.D	mg/lit	250	<10	<10
Fe	mg/lit	3	0.18	0.17
Mn	mg/lit	2	0.08	0.08
D.O	mg/lit	----	7	7
Oil & Grease	mg/lit	10	<1	<1

Note :- No Water Discharge from Mine

BDL- Below Detection Limit


Govt. Analyst




Laboratory Incharge

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Well Water Analysis Report

Mine Name: Sanquelim Mine

Date of Receipt of sample: 22.02.2017

Date of Sample collection :22.02.2017

Analysis completion date: 27.02.2017


Standard method used for analysis: APHA Standard

Test Report No: 254

Parameter	Unit	Desirable Limit	Location		
			Sesa Football Academy Well	Viridi Village Well	Market Well
Colour	Hazen	<5.0	<5	<5	<5
pH	-	6.5-8.5	6.55	6.31	6.35
Turbidity	NTU	1	0.9	0.8	1.0
Conductivity	µs/cm	-	300	96	70
Dissolved Solids	mg/lit	500	150	48	35
Suspended Solids	mg/lit	-	2	2	1
Chloride	mg/lit	250	35	7.0	8.9
Total Hardness as CaCO ₃	mg/lit	200	40.0	34	20.0
Calcium as Ca ⁺⁺	mg/lit	75	7.2	4.8	3.21
Magnesium as mg ⁺⁺	mg/lit	30	5.3	5.35	2.9
Sulphate as SO ₄	mg/lit	200	10	5.8	4
Nitrate as NO ₃	mg/lit	45	0.1	0.1	0.1
Alkalinity	mg/lit	200	19	22	16
Iron as Fe	mg/lit	0.3	0.14	0.11	0.05
Manganese as Mn	mg/lit	0.1	0.03	0.02	BDL
MPN/100ml	mg/lit	Absent	Absent	10	10


Authorized Govt. Analyst




Laboratory Incharge

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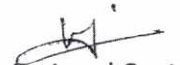
* Certified by ISO 9001: 2008, ISO 14001:2004 and OHSAS 18001:2007

Well water level Report


Mine Name: Sanquelim 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
			22.02.2017	
1	Virdi Village-Well	15	12.5	2.5
2	Football Academy	5.9	3.75	2.15
3	Market -Well	5.25	4	1.25


Authorized Govt. Analyst




Laboratory Incharge

M/s Sesa Environment Laboratory

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Well Water Analysis Report

Mine Name: Sanquelim Mine

Date of Sample collection :20.03.2017

Standard method used for analysis: APHA Standard


Test Report No: 266

Date of Receipt of sample: 20.03.2017

Analysis completion date: 25.03.2017

Parameter	Unit	Desirable Limit	Location		
			Sesa Football Academy Well	Virdi Village Well	Market Well
Colour	Hazen	<5.0	<5	<5	<5
pH	-	6.5-8.5	6.52	6.36	6.34
Turbidity	NTU	5	0.9	0.9	1.0
Conductivity	$\mu\text{S}/\text{cm}$	-	200	120	70
Dissolved Solids	mg/lit	500	100	60	35
Suspended Solids	mg/lit	-	1	1	1
Chloride	mg/lit	250	37	18	8
Total Hardness as CaCO_3	mg/lit	200	40	40	24
Calcium as Ca^{++}	mg/lit	75	7.3	6.5	4.05
Magnesium as mg^{++}	mg/lit	30	5.4	5.9	3.4
Sulphate as SO_4	mg/lit	200	6	1	2
Nitrate as NO_3	mg/lit	45	0.2	0.1	BDL
Alkalinity	mg/lit	200	30	16	15
Iron as Fe	mg/lit	0.3	0.05	0.05	0.06
Manganese as Mn	mg/lit	0.1	0.01	0.02	0.02
MPN/100ml	mg/lit	Absent	Absent	Absent	10

BDL- Below Detection Limit


Govt. Analyst




Laboratory Incharge

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Well water level Report

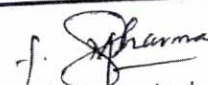
Mine Name: Sanquelim mine

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
			20.03.2017	
1	Virdi Village-Well	15	13	2
2	Football Academy	5.9	4	1.9
3	Market -Well	5.25	4.1	1.15


Govt Analyst




Laboratory Incharge

M/s Sesa Environment Laboratory

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Surface Water Analysis Report for the Month of March 2017

Mine Name: Sanquelim Mine

Date of Sample collection: 20.03.2017

Standard method used for analysis: APHA Standard

Test Report No: 265


Date of Receipt of sample: 20.03.2017

Analysis completion date : 25.03.2017


Parameter	Unit	Permissible limits	Location	
			Upstream Gauthona River	Downstream Gauthona River
Colour	Hazen	----	<5	<5
PH	----	5.5 to 9.0	6.86	6.89
Turbidity	NTU	----	1.0	1.0
Dissolved Solids	mg/lit	----	58	58
Conductivity	μ S/cm	----	116	116
T.S.S	mg/lit	100	2	2
Chlorides	mg/lit	----	7	7
Total Hardness as CaCO ₃	mg/lit	----	51	51
Calcium as Ca ⁺⁺	mg/lit	----	11.3	11.3
Magnesium as Mg ⁺⁺	mg/lit	----	5.4	5.4
Sulphate as SO ₄	mg/lit	----	2.0	2.1
Phosphate	mg/lit	5	0.1	BDL
Nitrate as NO ₃	mg/lit	10	0.1	0.1
B.O.D (3days, 27°C)	mg/lit	30	<3	3.2
C.O.D	mg/lit	250	<10	<10
Fe	mg/lit	3	0.19	0.18
Mn	mg/lit	2	0.08	0.08
D.O	mg/lit	----	7	6.7
Oil & Grease	mg/lit	10	<1	<1

Note :- No Water Discharge from Mine

BDL- Below Detection Limit


Govt. Analyst




Laboratory Incharge

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 December 2016

Mine Name: Sanquelim Mine

Date of Sample collection: 26.12.2016

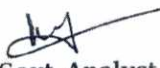

Standard method used for analysis: APHA Standard

Test Report No: 219

Date of Receipt of sample: 26.12.2016

Analysis completion date : 31.12.2016

Parameter	Unit	Location		
		Permissible limits	Upstream Gauthona River	Downstream Gauthona River
Colour	Hazen	----	<5	<5
PH	----	5.5 to 9.0	7.05	6.84
Turbidity	NTU	----	1.0	1.0
Dissolved Solids	mg/lit	----	42	43
Conductivity	μ S/cm	----	85	86
T.S.S	mg/lit	100	2	2
Chlorides	mg/lit	----	7	7
Total Hardness as CaCO ₃	mg/lit	----	38	36
Calcium as Ca ⁺⁺	mg/lit	----	8.8	8.0
Magnesium as Mg ⁺⁺	mg/lit	----	3.9	3.9
Sulphate as SO ₄	mg/lit	----	1.8	2.0
Phosphate	mg/lit	5	BDL	BDL
Nitrate as NO ₃	mg/lit	10	0.1	0.2
B.O.D (3days, 27°C)	mg/lit	30	<3	<3
C.O.D	mg/lit	250	<10	<10
Fe	mg/lit	3	0.09	0.10
Mn	mg/lit	2	0.03	0.03
D.O	mg/lit	----	7	7
Oil & Grease	mg/lit	10	<1	<1

Note :- No Water Discharge from Mine
BDL- Below Detection Limit
Govt. Analyst
Laboratory Incharge

M/s Sesa Environment Laboratory

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Well Water Analysis Report

Mine Name: Sanquelim Mine

Date of Receipt of sample: 26.12.2016

Date of Sample collection :26.12.2016

Analysis completion date: 31.12.2016

Standard method used for analysis: APHA Standard

Test Report No: 220

Parameter	Unit	Permissible Limit	Location		
			Sesa Football Academy Well	Virdi Village Well	Market Well
Colour	Hazen	<5.0	<5	<5	<5
pH	-	6.5-8.5	6.53	6.24	6.5
Turbidity	NTU	5	0.9	0.8	0.1
Conductivity	µs/cm	-	80	248	64
Dissolved Solids	mg/lit	500	40	124	32
Suspended Solids	mg/lit	-	1	2	2
Chloride	mg/lit	250	9	60	12
Total Hardness as CaCO ₃	mg/lit	200	30	40	18
Calcium as Ca ⁺⁺	mg/lit	75	4.0	5.6	2.4
Magnesium as mg ⁺⁺	mg/lit	30	4.9	6.3	2.9
Sulphate as SO ₄	mg/lit	200	1.0	4.8	1
Nitrate as NO ₃	mg/lit	45	BDL	0.1	0.1
Alkalinity	mg/lit	200	31	26	22
Iron as Fe	mg/lit	0.3	0.07	0.06	0.09
Manganese as Mn	mg/lit	0.1	0.03	0.02	0.03
MPN/100ml	-	Absent	21	Absent	10

BDL- Below Detection Limit

Govt. Analyst



Laboratory Incharge

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Well water level Report

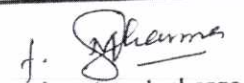
Mine Name: Sanquelim Mine

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
			26.12.2016	
1	Virdi Village-Well	16	12.2	3.8
2	Football Academy	5.9	3.1	2.8
3	Market -Well	5.25	3.2	2.1


Govt Analyst




Laboratory Incharge

M/s Sesa Environment Laboratory
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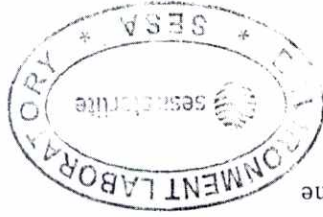
Surface Water Analysis Report for the Month of November 2016

Mine Name: Sanguelim Mine
Date of Sample collection: 16.11.2016
Date of Receipt of sample: 16.11.2016
Analysis completion date: 21.11.2016
Standard method used for analysis: APHA Standard
Test Report No: 199

Parameter	Unit	Permissible limits	Upstream Gauthona River	Downstream Gauthona River	Location
Colour	Hazen	---	<5	<5	
PH	---	5.5 to 9.0	6.61	6.68	
Turbidity	NTU	---	1.2	1.3	
Dissolved Solids	mg/lit	---	36	34	
Conductivity	µS/cm	---	72	68	
T.S.S	mg/lit	100	3	2	
Chlorides	mg/lit	---	9	8	
Total Hardness as CaCO ₃	mg/lit	---	26	24	
Calcium as Ca++	mg/lit	---	6.4	5.6	
Magnesium as Mg++	mg/lit	---	2.4	2.4	
Sulphate as SO ₄	mg/lit	---	2.0	2.0	
Phosphate	mg/lit	5	BDL	BDL	
Nitrate as NO ₃	mg/lit	10	0.1	0.1	
B.O.D (3days, 27°C)	mg/lit	30	<3	<3	
C.O.D	mg/lit	250	<10	<10	
Fe	mg/lit	3	0.08	0.09	
Mn	mg/lit	2	0.02	0.03	
D.O	mg/lit	---	7	7	
Oil & Grease	mg/lit	10	<1	<1	

Note :- No Water Discharge from Mine
BDL- Below Detection Limit

Govt. Analyst



Laboratory Incharge

M/s Sesa Environment Laboratory

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Well Water Analysis Report

Mine Name: Sanquelim Mine

Date of Sample collection :16.11.2016

Standard method used for analysis: APHA Standard

Test Report No: 200

Date of Receipt of sample: 16.11.2016


Analysis completion date: 21.11.2016

Parameter	Unit	Permissible Limit	Location		
			Sesa Football Academy Well	Virdi Village Well	Market Well
Colour	Hazen	<5.0	<5	<5	<5
pH	-	6.5-8.5	6.51	6.54	6.54
Turbidity	NTU	5	0.9	0.8	0.8
Conductivity	µs/cm	-	76	44	56
Dissolved Solids	mg/lit	500	38	22	28
Suspended Solids	mg/lit	-	2	2	2
Chloride	mg/lit	250	9	7	7
Total Hardness as CaCO ₃	mg/lit	200	28	12	16
Calcium as Ca ⁺⁺	mg/lit	75	6.4	2.4	4.0
Magnesium as mg ⁺⁺	mg/lit	30	2.9	1.5	1.5
Sulphate as SO ₄	mg/lit	200	1.0	1.3	1.8
Nitrate as NO ₃	mg/lit	45	BDL	0.1	0.1
Alkalinity	mg/lit	200	36	22	22
Iron as Fe	mg/lit	0.3	0.07	0.04	0.08
Manganese as Mn	mg/lit	0.1	0.03	BDL	0.01
Coliform (MPN) Organism/100ml	-	Absent	18	16	10

BDL- Below Detection Limit


Govt. Analyst




Laboratory Incharge

M/s Sesa Environment Laboratory

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

Well water level Report

Mine Name: Sanguelim mine

Instrument Used: Well water tape

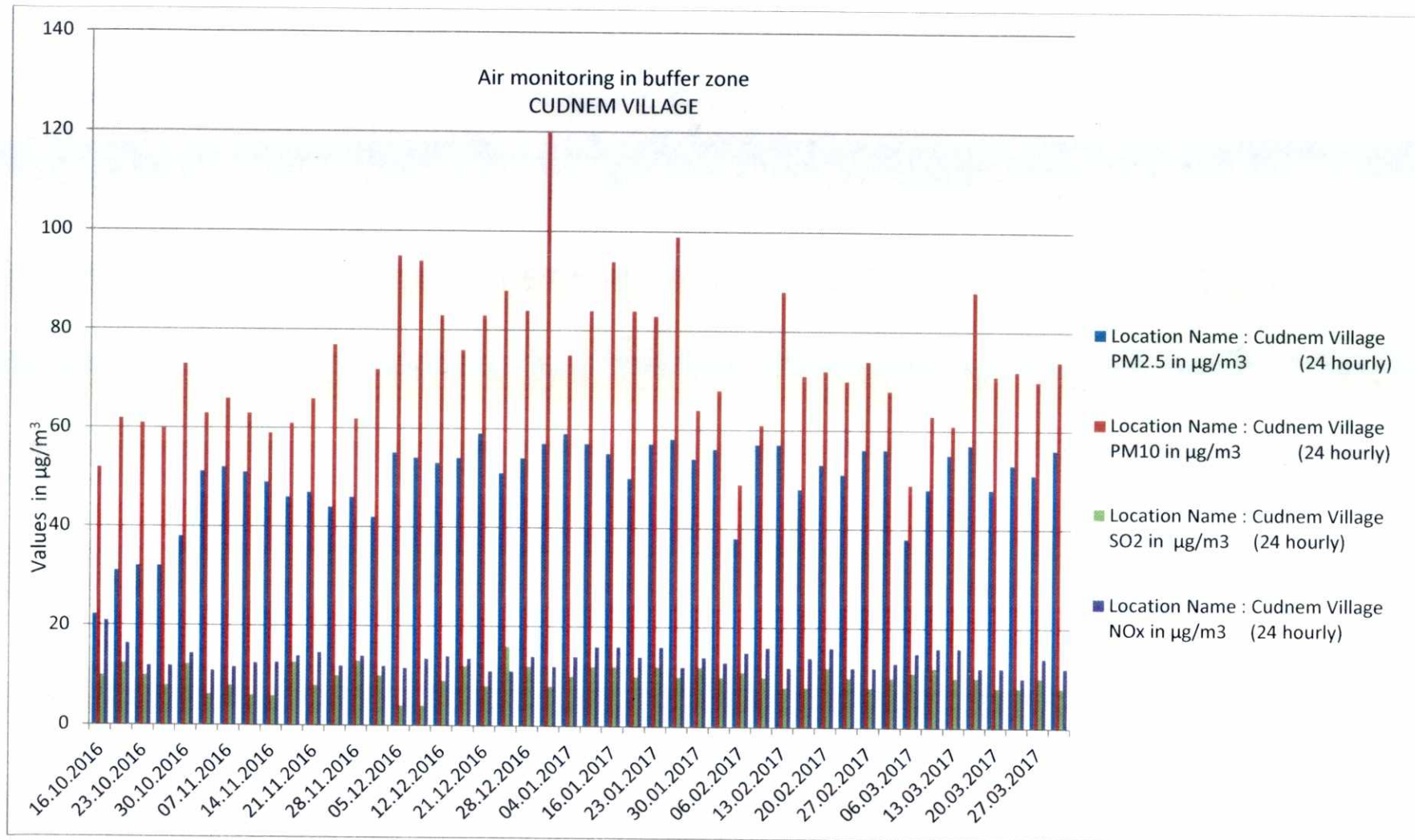
Sr.No	Location	Total Depth of well in mtr	Depth of Water level from the reference point in mtr	Water Column in mtr
1	Virdi Village-Well	16	11.3	4.7
2	Football Academy	5.9	2.53	3.4
3	Market - Well	5.25	2.6	2.7

Laboratory Incharge

Govt Analyst

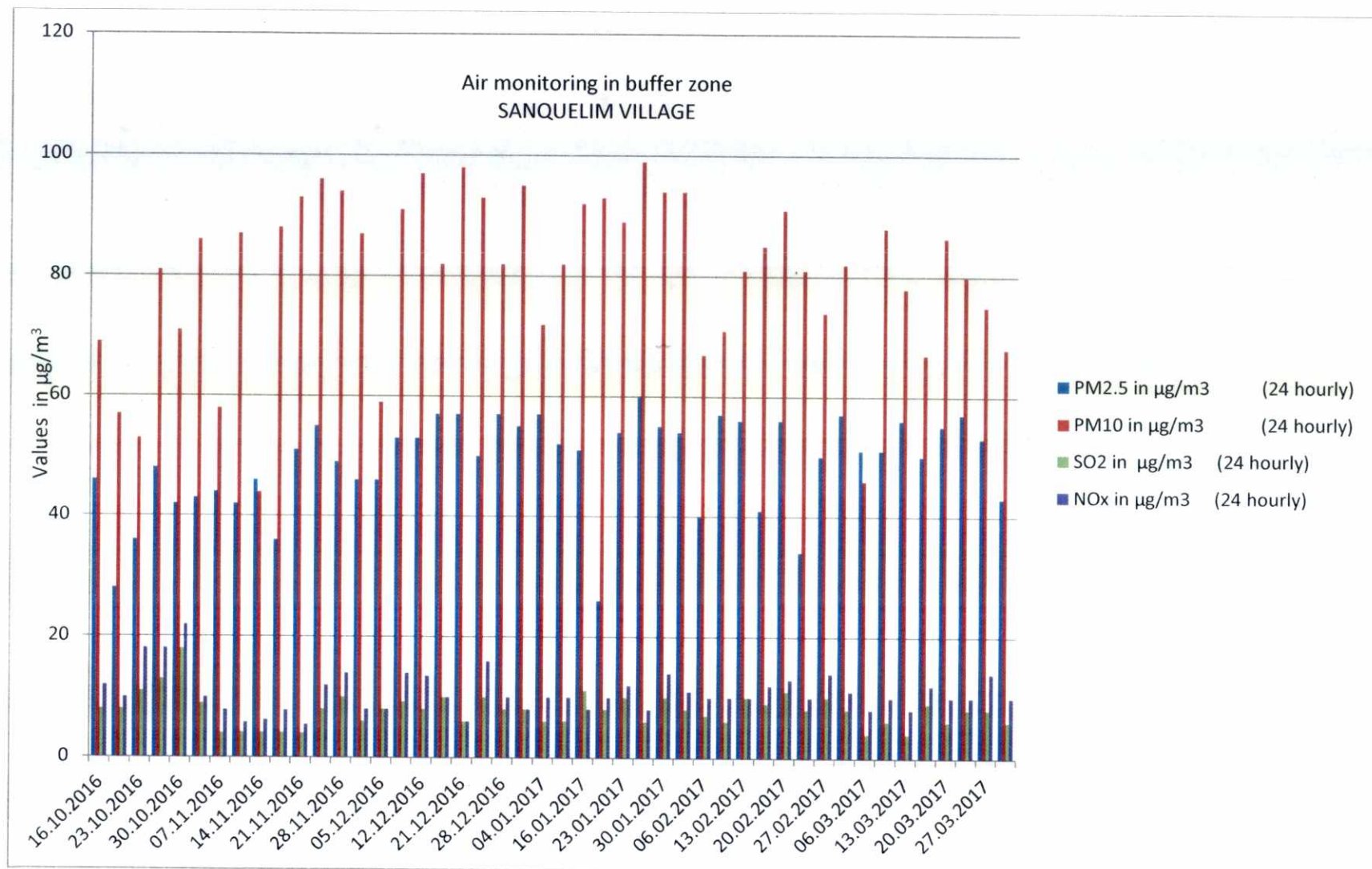
Ambient Air Quality Monitoring Report

Sanquelim Iron Ore Mine



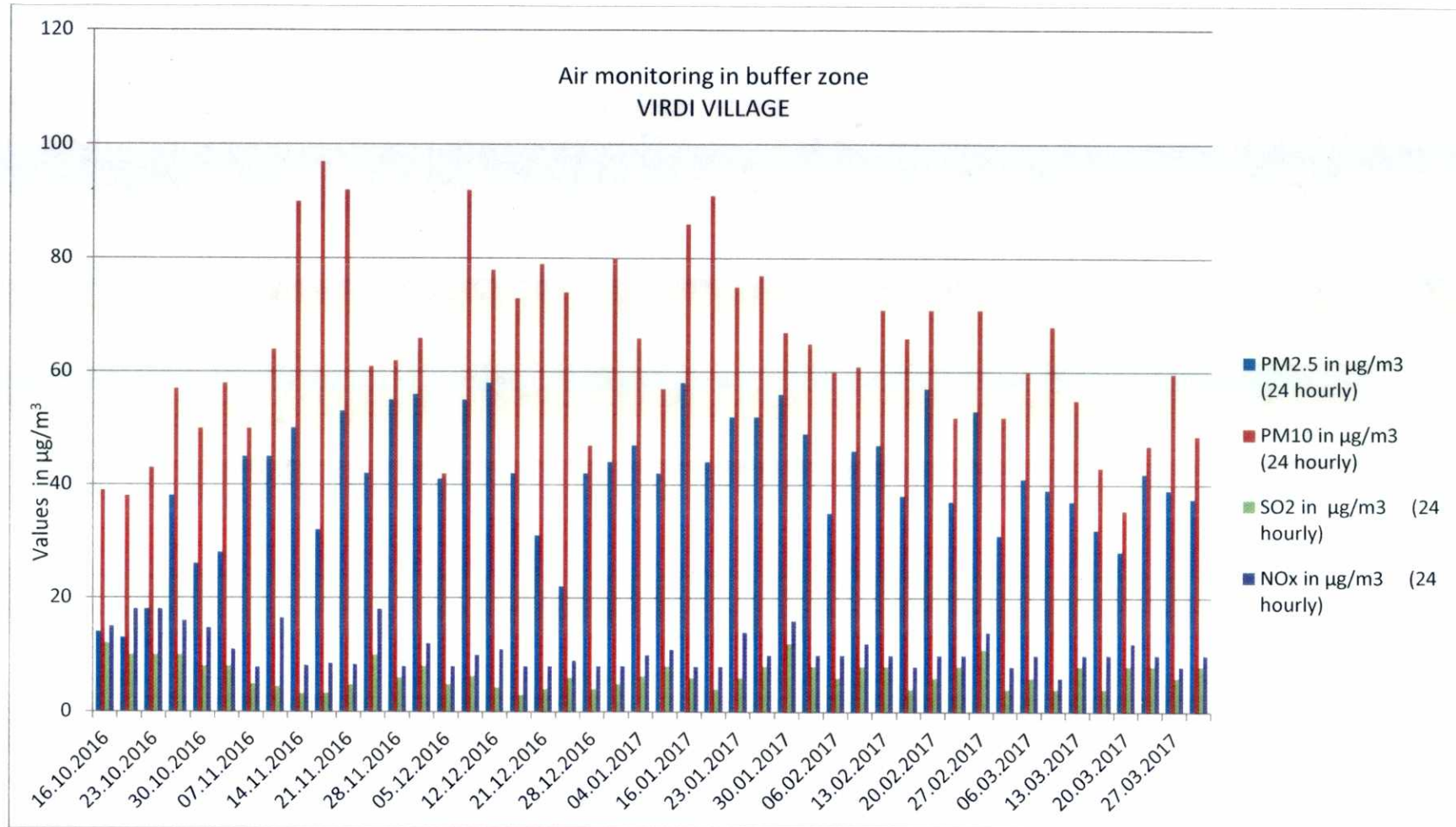
Ambient Air Quality Monitoring Report

Sanquelim Iron Ore Mine



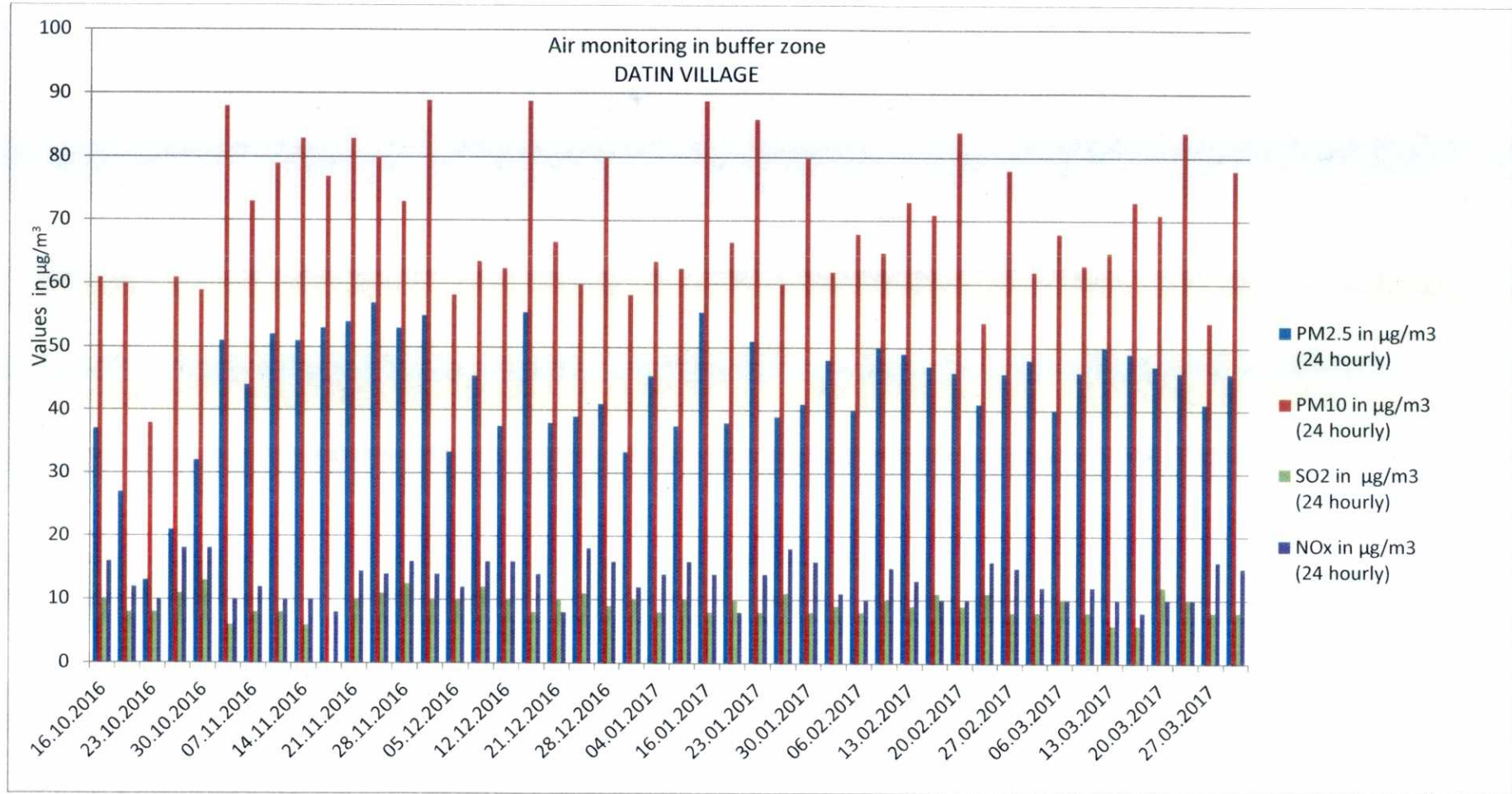
Ambient Air Quality Monitoring Report

Sanquelim Iron Ore Mine



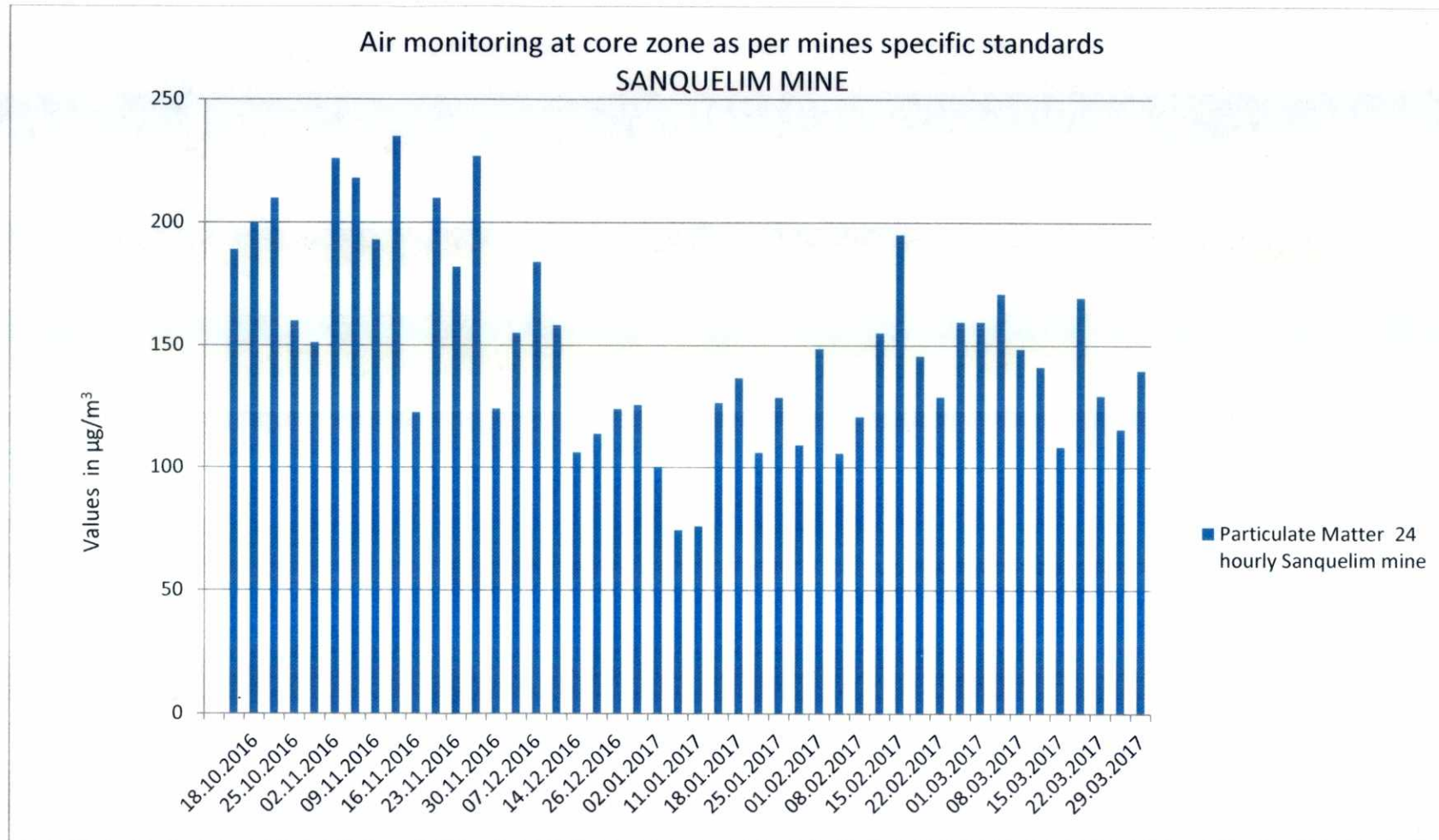
Ambient Air Quality Monitoring Report

Sanquelim Iron Ore Mine



Ambient Air Quality Monitoring Report

Sanquelim Iron Ore Mine



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Well water level Report


Mine Name: Sanquelim 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
			10.10.2016	
1	Virdi Village-Well	16	7.2	8.8
2	Football Academy	5.9	1.4	4.5
3	Market -Well	5.25	2.1	3.2


Govt Analyst



for 
Laboratory Incharge

M/s Sesa Environment Laboratory

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Well Water Analysis Report

Mine Name: Sanquelim Mine

Date of Receipt of sample: 10.10.2016

Date of Sample collection :10.10.2016

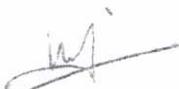
Analysis completion date: 17.10.2016

Standard method used for analysis: APHA Standard

Test Report No: 180

Parameter	Unit	Permissible Limit	Location		
			Sesa Football Academy Well	Virdi Village Well	Market Well
Colour	Hazen	<5.0	<5	<5	<5
pH	-	6.5-8.5	6.51	6.53	6.54
Turbidity	NTU	5	1.8	1.6	2.6
Conductivity	µs/cm	-	66	40	46
Dissolved Solids	mg/lit	500	33	20	23
Suspended Solids	mg/lit	-	2	2	2
Chloride	mg/lit	250	7	7	7
Total Hardness as CaCO ₃	mg/lit	200	26	12	14
Calcium as Ca ⁺⁺	mg/lit	75	5.6	4.0	3.2
Magnesium as mg ⁺⁺	mg/lit	30	2.9	0.5	1.5
Sulphate as SO ₄	mg/lit	200	1.0	2	2.9
Nitrate as NO ₃	mg/lit	45	BDL	BDL	0.1
Alkalinity	mg/lit	200	40	20	22
Iron as Fe	mg/lit	0.3	0.07	0.03	BDL
Manganese as Mn	mg/lit	0.1	0.02	BDL	BDL
MPN/100ml	-	Absent	11	25	38

BDL- Below Detection Limit


Govt. Analyst


Laboratory Incharge

M/s Sesa Environment Laboratory

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Surface Water Analysis Report for the Month of October 2016

Mine Name: Sanquellim Mine

Date of Sample collection: 10.10.2016

Standard method used for analysis: APHA Standard

Test Report No: 179

Date of Receipt of sample: 10.10.2016

Analysis completion date : 17.10.2016

Parameter	Unit	Location		
		Permissible limits	Upstream Gauthona River	Downstream Gauthona River
Colour	Hazen	----	7	8
PH	----	5.5 to 9.0	6.56	6.58
Turbidity	NTU	----	1.7	1.9
Dissolved Solids	mg/lit	----	31	32
Conductivity	μ S/cm	----	62	64
T.S.S	mg/lit	100	4	4
Chlorides	mg/lit	----	7	8
Total Hardness as CaCO ₃	mg/lit	----	22	22
Calcium as Ca ⁺⁺	mg/lit	----	5.6	5.6
Magnesium as Mg ⁺⁺	mg/lit	----	1.9	1.9
Sulphate as SO ₄	mg/lit	----	2.1	2.9
Phosphate	mg/lit	5	BDL	BDL
Nitrate as NO ₃	mg/lit	10	0.1	0.1
B.O.D (3days, 27oc)	mg/lit	30	<3	<3
C.O.D	mg/lit	250	<10	<10
Fe	mg/lit	3	0.03	0.02
Mn	mg/lit	2	BDL	BDL
D.O	mg/lit	----	7	7
Oil & Grease	mg/lit	10	<1	<1

Note :- No Water Discharge from Mine

BDL- Below Detection Limit


Govt. Analyst




Laboratory Incharge