

HALF YEARLY COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE

(For the period of Oct. 2017 to March 2018)

(Ref: F. No. J – 11011/1170/2007 – IA II (I) dated 13th May, 2009)

Sr. No.	CONDITIONS	COMPLIANCE STATUS
1.	Continuous monitoring system to monitor gaseous emission shall be provided and limit of SPM shall be controlled within 50 mg/Nm ³ by installing adequate air pollution control system.	<ul style="list-style-type: none">• Continuous Emission monitoring System for the monitoring of SO_x, NO_x and CO is installed at RABH stack and Opacity meters have been installed at all major stacks for the monitoring of the PM. All continuous monitoring systems installed at Stacks have been connected to CECB Raipur and CPCB New Delhi.• The emission of PM is maintained well within the prescribed limit as we have been installed state of art Air Pollution Control Equipments with adequate capacities.
2.	High efficiency electrostatic precipitators (ESPs) to clinker cooler and AFBC boiler (CPP); bag house to raw mill / kiln system, coal /pet coke mill system and cement mill, bag filters to crushing plant, raw mill hopper, blending silo / kiln feed, clinker storage, cement mill hopper, cement silo, transfer points, packing plant etc shall be provided to reduce pollution and gaseous emissions to <50 mg/Nm ³ . AFBC boilers shall be installed to control SO ₂ and NO _x emissions. At no time, particulate emissions from the cement plant shall exceed 50 mg/Nm ³ . All the pollution control equipments in raw mill / kiln, kiln feeding system, clinker cooler, coal mill, cement mill and cement silo shall be interlocked so that the event of the pollution control equipment not working, the respective unit (s) is shut down automatically. Continuous stack monitoring facilities for all the stacks and adequate air pollution control systems shall be providing and data submitted to the Ministry's Regional Office Bhopal half yearly, CPCB and CECB quarterly.	<ul style="list-style-type: none">• Reverse Air Bag House Installed at Raw Mill/Kiln system. High efficiency Electro static precipitator installed at Clinker Cooler.• The mills including Coal mill, Slag Mill, Cement Mill -1 and -2 are fully equipped with the efficient bag houses.• Efficient dust extraction systems (Bag filters) are installed at all transfer points covering work of transfer points, conveyors, Crushing plants, Material handling units, materials storage area, storage silos to maintain the emission well within the prescribed limit.• Interlocked systems has been already provided at all major Air pollution control equipments for auto shut down in case of failure of any pollution control equipments.• Continuous Stack emission mentoring data are being uploaded on the CPCB & CECB server.• Half yearly compliance report are being submitted to MOEFCC regional office Nagpur and Quarterly Report submitted to CPCB and CECB.
3.	Ambient air quality monitoring stations shall be set up in the down wind direction as well where maximum ground level concentration of SPM, SO ₂ and NO _x are anticipated as per statutory	<ul style="list-style-type: none">• Being Complied.• To continuously monitor Ambient Air Quality, 05 no of continuous ambient air monitoring

	<p>requirement in consultation with Chhattisgarh Environment Conservation Board (CECB). Ambient air emission shall not exceed the standards stipulated under EPA or by the State authorities. Monitoring of ambient air quality shall be carried out regularly in consultation with CECB and data submitted to the Ministry's Regional Office at Bhopal half-yearly, CPCB and CECB quarterly.</p>	<p>systems have been already installed including 04 No at plant and 01 at mines premises.</p> <ul style="list-style-type: none"> • Data of ambient air quality monitoring are being displayed on display board installed at main gate.
4.	<p>The fugitive emissions during loading and unloading should be suitably controlled by installing adequate dust collection and extraction system and at all the transfer points. Fugitive emissions shall also be controlled by providing silos and closed roof sheds for raw materials and product. Water sprinkling arrangement shall be made in the raw material stock yard and cement bag loading areas to prevent fugitive emissions. Bag filters shall be provided to coal and limestone handling system. Dust suppression system and water spraying shall be provided in the mine area to control fugitive emissions due to drilling and handling and transportation of general public.</p>	<ul style="list-style-type: none"> • Efficient dust collection and extraction systems (Bag filters) are installed at all loading, unloading and all transfer points. • All the conveyer belts carrying the material are fully covered. • All the raw materials including lime Stone, Coal, Slag & Gypsum etc are being stored in the closed sheds. • Silos are provided for the storage of Clinker, Fly ash and Cement. • Efficient Bag Filters are provided at Coal and Lime stone handling systems. • Dust Suppression and water sprinkling, systems have been already provided at mines area • Wet drilling method is being imparted to control the dust emission during drilling. • 02 No of water tankers engaged for dust suppression purposes at Mines.
5.	<p>Data on ambient air quality, stack emission and fugitive emissions shall be uploaded on the company website and also regularly submitted on-line to the Ministry's Regional Office at Bhopal, Chhattisgarh Environment Conservation Board (CECB) and Central pollution Control Board (CPCB) as well as hard copy once in six months. Data on SPM, SO₂ and NO_x shall also be displayed prominently outside the premises at the appropriate place for the information of general public</p>	<ul style="list-style-type: none"> • Data of ambient air quality monitoring are being displayed on display board installed at main gate. • Connectivity of online ambient air quality monitoring and stack emission monitoring data with CPCB server has been provided. • Links for the same are http://adagecpcb.glensserver.com/ http://cecb.glensserver.com/ www.envsaindia.com/cpcb/login.php
6.	<p>Secondary fugitive emissions from all the sources shall be controlled within the permissible limits by the Ministry and regularly monitored. Guidelines /Code of Practice issued by the CPCB shall be followed.</p>	<ul style="list-style-type: none"> • All necessary measure has been taken to control the Secondary fugitive emissions within the permissible limits.
7.	<p>Asphalting /Concreting of roads and water spray all around the critical areas prone to air pollution and having high levels of SPM and RPM shall be ensured</p>	<ul style="list-style-type: none"> • The plant and mines area have concrete road for road transportation and 02 No of water tankers engaged for dust suppression

		purposes at Mines
8.	No new pit shall be opened till old pit is exhausted	To open new pit, EC amendment have been done by the MOEF & CC vide letter no J-11011/1770/2007-IA II (I) Dated 07.06.2017
9.	Efforts shall be made to reduce impact of the transport of the raw materials and end products on the surrounding environment including agricultural land. All the raw material materials including fly ash shall be transported in closed containers only and should not be overloaded. Vehicular emissions shall be regularly monitored.	<ul style="list-style-type: none"> • Noted & Being complied, the construction of pipe conveyer belt is not completed due to land acquisition of approx 300m piece of land from Bhilai Steel plant (SAIL) , Remaining portion of pipe conveyer is already completed necessary material have been procured from Bridgestone, Japan. However EC amendment to change the mode of Lime stone transportation from mine to plant have been done by MOEF vide letter no. J-11011/1170/2007 IA –II (I) dated 23.07.2015. • Detail showing the progress of the pipe conveyer is attached as Annexure-I
10.	Total water requirement from Shivnath River and bore wells shall not exceed 4500 m ³ /day. The water stored in the artificial reservoir made in the mines pit shall be used maximum to reduce ground water consumption. Air cooled condensers shall be provided to CPP to reduce water consumption. The process effluent from CPP treated in neutralization pit shall be recycled back in the process after treatment and used for cooling and dust suppression. Mining shall not intercept ground water table. No effluent shall be discharged from the cement plant, captive power plant and limestone mines and 'Zero' discharge should be strictly followed. Domestic waste water shall be treated in sewage treatment plant (STP) and used for green belt development.	<ul style="list-style-type: none"> • Will be complied • Root zone technology based Sewage Treatment plant with installed capacity 70 m³/day is under operation and the treated water is being utilized for the Dust suppression and green Belt development. • Presently, the construction work of Power Plant is under progress and expected to be commissioned by Dec. 2018. We have achieved zero discharge condition.
11.	Permission for the drawl of 4500 m ³ /day water from Shivnath river and ground water from CGWA/SCWP / concern department shall be obtained and copy of the permission shall be submitted to the Ministry's Regional office at Bhopal.	<ul style="list-style-type: none"> • Permission for drawl of water from Shivnath river and ground water from CGWA has been already obtained vide CGWA letter no 21-4(34)/NCCR/CGWA/2012-2036 Dated 26th Sept 2016 • Permission from WRD, CG for use of Shivnath river water has been obtained vide F 4-165/S-2/31/Industrial water uses/2010, Raipur /09/2013.
12.	Detailed hydrological study shall be carried out and implementation of recommendations of the detailed hydrological study shall be ensured.	<ul style="list-style-type: none"> • Detailed hydrological study has been carried out and status of compliances / recommendations being regularly submitted to the CGWA.

13.	All the bag filter dust, raw meal dust, coal dust, clinker dust and cement dust from Pollution control devices shall be recycled and reused in the process and used for cement manufacturing. STP sludge shall be used as manure. Waste oil shall be sold to authorize recyclers/re-processors only.	<ul style="list-style-type: none"> • All the bag filter dust, raw meal dust, coal dust, clinker dust and cement dust from Pollution control devices being recycled and reused in the process and used for cement manufacturing. The sludge of STP being used as manure and waste oil & used oil being sold to authorized recyclers from CECB.
14.	An effort shall be made to use of high calorific hazardous waste in the cement kiln and necessary provision shall be made accordingly.	<ul style="list-style-type: none"> • Noted and Necessary provision has been already made.
15.	Effort shall be made to use low grade lime, more fly ash and solid waste in the cement manufacturing.	<ul style="list-style-type: none"> • Being complied.
16.	Action plan for mining, management of over burden (removal, storage, disposal etc.,) reclamation of the mined out area and mines closure shall be submitted to the Ministry and its Regional office at Bhopal.	<ul style="list-style-type: none"> • Already complied vide letter No. JKLC/Durg/Env/1109 dated 12.12.2011.
17.	All the fly ash should be utilized as per Fly Ash Notification, 1999 subsequently amended in 2003. Effort shall be made use fly ash generated from the captive power plant maximum in manufacturing Pozollona Portland Cement (PPC)	<ul style="list-style-type: none"> • Being complied
18.	As proposed , green belt shall be developed in at least 78 ha (38%) out of total 210 ha area in the cement plant area and all the mined out area except used for reservoir to reduce impact of fugitive emissions as per Central Pollution Control Board (CPCB) guidelines in consultation with DFO	<ul style="list-style-type: none"> • The company has employed about 60 nos of workers which engaged in plantation work around the boundary as well in the mines area. • Three water tankers have been engaged for watering of these plants. • So far the company has planted about 144921 including 77885 plants in mines area and 67036 plants in Factory area • We have developed in-house Nurseries where about 30500 saplings have been developed for further green belt development in the plant and mines area. • Under Harihar Chhattisgarh Project Total 36280 plants planted in the open area of nearby villages. • Plantation Report Enclosed as Annexure – II
19.	Wet drilling blasting method and provision for the control air emissions during blasting using dust collectors etc. shall be used.	<ul style="list-style-type: none"> • Wet drilling/blasting method is being used to control the dust emission.

20.	Bench height, width and slope for individual bench shall be properly assessed and implemented. Adequate measures shall be adopted to stabilize the slope before abandonment. The fencing around the reservoir shall be provided to prevent accidents.	<ul style="list-style-type: none"> • Being complied
21.	The company shall obtained necessary clearances/ approval from the concerned Departments i.e. 'No Objection Certificate' form the Chhattisgarh Environment Conversation Board (CECB) , Indian Bureau of Mines, State Government, MoEF etc. for the linking mining component before undertaking any construction activity at the project site.	<ul style="list-style-type: none"> • Already complied and copies of the same has been already submitted to MOEF & CC.
22.	All the safety norms stipulated by the Director General, Mines and Safety (DGMS) shall be implemented.	<ul style="list-style-type: none"> • Being complied. • The necessary Personal Protective Equipments (PPEs) has already provided to the employees and workers.
23.	Rehabilitation and resettlement plan for the project affected population including tribals as per the policy of the State Govt. of Chhattisgarh in consultation with the State Govt. shall be implemented. Compensation paid in any case shall not be less than norms prescribed under the National Resettlement and rehabilitation Policy '2007	<ul style="list-style-type: none"> • R & R is not applicable on us.
24.	All the recommendation mentioned in the Corporate Responsibility for Environment Protection (CREP) guidelines shall be followed implemented	<ul style="list-style-type: none"> • Noted and Being Followed
25.	The company shall provide housing for construction labor within site with all necessary infrastructure and facilities such as fuel for cooking , mobile toilet, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project	<ul style="list-style-type: none"> • The company has provided housing for labor within site with all necessary infrastructure and facilities were provided during construction stage. • Sewage Treatment plant based on Root zone technology with installed capacity of 70 m3/day is provided for the treatment of swage from worker's colony and the treated water is being utilized for the Dust suppression and green Belt development
B.	GENERAL CONDITIONS:	
1.	The project authorizes must strictly adhere to the stipulations made by the Chhattisgarh Environment Conservation Board (CECB) and the State Government.	<ul style="list-style-type: none"> • Being complied
2.	No further expansion or modifications in the plant should be carried out without prior approval of the Ministry of Environment and Forests.	<ul style="list-style-type: none"> • Noted

3	The company shall provide adequate dust collection and extraction system to control fugitive dust emissions at various transfer points, raw mill handling (unloading, conveying, transportation, stacking), vehicular movement, bagging and packing areas etc. Asphalted /concreting of roads and water spray all around the coal stockpiles shall be carried out to control fugitive emissions.	<ul style="list-style-type: none"> • Adequate dust collection and extraction system provided at various transfer points, raw mill handling (unloading, conveying, transportation, stacking), bagging and packing areas to control fugitive dust emissions. • All internal roads / area have been concreted to control fugitive emissions during road transportation.
4.	Industrial waste water shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 th May 1993, and 31 st December, 1993 or as amended from time to time. The treated wastewater shall be utilized for plantation purpose.	<ul style="list-style-type: none"> • Treated water from STP is being utilized for green belt development and dust suppression purposes and there is no waste water generated from cement manufacturing process. We maintain Zero Discharge status.
5.	The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all the sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz 75 dBA (day time) and 70 dBA (nighttime)	<ul style="list-style-type: none"> • We are taking all the precautionary measures to control the noise pollution and ensure that the noise will be well within specified limits. • Regular noise level monitoring is being conducted at plant site and mines area.
6.	The company shall harvest the rain water from the roof tops and storm water drains to recharge the ground water. The company must also collect rain water in the mined out pits and use the same water for the various activities of the project to conserve fresh water.	<ul style="list-style-type: none"> • Being complied • To harvest rain water, company has constructed 52 no of various rain water harvesting systems with a rain water harvesting capacity of 520108 m³/annum @ rainfall of 951 mm (2017).
7.	All the recommendations of the CREP guidelines shall be strictly followed.	<ul style="list-style-type: none"> • Noted & being followed
8.	The project proponent shall also comply with all the environment protection measures and safeguards recommended in the EIA/EMP reports	<ul style="list-style-type: none"> • Noted & being complied.
9.	The company must undertake socio-economic development activities in the surrounding villages like community development programs, educational programs, drinking water supply and health care etc.	<ul style="list-style-type: none"> • Company is doing its CSR activity for the socio-economic development of nearby 07 Villages
10.	As proposed, Rs.125.00 Crores and Rs.8.00 Crores earmarked towards total capital cost and recurring cost/annum for environmental pollution control measures Rs.1.00 Crores for socio-economic development program shall be used to implement the condition stipulated by the Ministry of Environment and Forests as well as the State Government and an implementation schedule for implementing all the conditions stipulated herein shall be submitted to the Regional Office of this Ministry at Bhopal. The fund provided shall not be diverted for any other purpose.	<ul style="list-style-type: none"> • We have incurred the expenditure of Rs. 83.23 Crore for the installation of Air pollution control equipments of Phase I which is under operation with the capacity of 1.5 MTA clinker, 05 MTA cement production & 08 MW WHR based Power Plant and 2.4 MTPA Limestone mine. • For the socio economic development we have adopted 07 nearby villages and implementing the CSR programs in these villages. • The detailed CSR action plan (40 years) have been submitted to MoEF & CC vide letter

		number b-1011/3/2008-M&MP Dated 15.02.2010
11.	The Regional Officer of this Ministry at Bhopal /CPCB /CECB will monitor the stipulated conditions. A six monthly compliance report and the monitoring data along with statistical interpretation shall be submitted to them regularly.	<ul style="list-style-type: none"> • Half Yearly Environment Compliance report being regularly submitted to Regional Offices of CPCB (Bhopal), MoEF & CC (Nagpur) and CECB (Raipur).
12.	The Project Proponent shall inform public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the CECB /Committee and may also be seen at Website of the Ministry of Environment and Forest at http://envfor.nic.in .This shall be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office at Bhopal.	<ul style="list-style-type: none"> • To inform public about the accordance of environment Clarence, an advertisement was published in local newspapers and a copy of the same was forwarded to than Regional office of MoEF & CC at Bhopal. • Copy of Environment clearance has been also uploaded on the company website
13.	Project authorities shall inform the Regional Office as well as the Ministry, the date of the financial closure and final approval of the project by the concerned authorities and date of commencing the land development work.	<ul style="list-style-type: none"> • Already complied vide our letter no JKLC/Durg/Env/1206 dated 15.06.2011 and company is following the year starts from April & ends in March (April-March) for the financial matters.

HALF YEARLY COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE

(For the period of Oct. 2017 to March 2018)

(Ref: F. No. J – 11011/1170/2007 – IA II (I) dated 27th February 2010)

S. No.	CONDITION	COMPLIANCE STATUS
1.	At least 5 % of the total cost of the project (viz.Rs.1100.00 Crores) shall be earmarked towards the corporate social responsibility and item –wise details along with time bound action plan shall be prepared and submitted to the Ministry's Regional Office at Bhopal .The corporate social responsibility (CSR) facilities shall be extended to all the persons residing in 15 Km instead of 10 Km radius to cover all the villagers of old location also. Implementation of such program shall be ensured accordingly in a time bound manner.	<ul style="list-style-type: none">• The details of CSR activities & incurred expenditure is enclosed as Annexure - III
2.	The National Ambient Air Quality Emission Standards issued by the Ministry vide GSR No.826 (E) dated 16 th November,2009 shall be followed.	<ul style="list-style-type: none">• Being complied
3.	A copy of clearance letter shall be sent by the proponent to concerned Panchayat /Zila Parishad/Municipal Corporation, Urban Local Body and local NGO, if any form whom suggestions/representations, if any received while processing the proposal .The clearance letter shall also be put on the web site of the company by the proponent.	<ul style="list-style-type: none">• Complied
4.	The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitoring data on the website and shall update the same periodically .It shall simultaneously be sent to the Regional Office of the MOEF at Bhopal, the respective Zonal Office of CPCB and the CPCB. The criteria pollutants levels namely : SPM, RSPM,SO ₂ ,NO _x (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	<ul style="list-style-type: none">• Being Comply.• The environment Compliance report including monitoring data is being uploaded on the company website.• Copy of the compliance report is being submitted to the Regional office of MoEFCC, Nagpur, CPCB Zonal office Bhopal and Regional office CECB Bhilai regularly.• Environment monitoring data is being displayed on the online display board installed at Plant and Mines Main Gate in public domain and also summary of data uploaded on the Company website.
5.	The project proponent of compliance in the stipulated environment conditions including results of monitoring data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and SPCB. The Regional Office of this Ministry at Bhopal /CPCB/CECB shall	<ul style="list-style-type: none">• Half year compliance report for the period of Oct 17 to March 18 is enclosed as Annexure IV.

	monitor the Stipulated conditions.	
6.	The Environmental statement for each financial year ending 31 st March in Form –V as it mandated to be submitted by the project proponent to the concerned State Pollution Control Board As prescribed under the Environmental (Protection) Rule 1986, as amended subsequently, shall also be put on the web site of the company along with the status of compliance of environmental condition and shall also be sent to the respective Regional Offices of the MOEF by e-mail.	<ul style="list-style-type: none"> • Environment statement of last year submitted on 30.05.2017
7.	The Project Proponent shall inform the public that the project has been accordance environmental clearance by the Ministry and copies of the clearance letter are available with the CECB and may also be seen at Website of the Ministry of Environment and Forest at http://envfor.nic.in . This shall be advertised be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office at Bhopal.	<ul style="list-style-type: none"> • Already Complied
8.	Project authorities shall inform the Regional Office at Bhopal as well as the Ministry, the local of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.	<ul style="list-style-type: none"> • Already Complied vide our letter No JKLC/Durg/Env/1206 Dated 15.06.2011.

PIPE CONVEYER DETAILS

SR No.	PARAMETER	DETAILS
1	Material. Handled	LIMESTONE
2	Design capacity (T/hr)	1320
3	Profile length, (M)	5248.00
4	Lift, (M)	22.65
5	Belt width, (mm)	1600
6	Pipe diameter (mm)	400
7	Belt speed, (M/sec)	3.07
8	Designed By	Shree Conveyer
9	Belt Supplied by	Bridgestone, Japan
10	Total work Completed	80 %
11	Total Work Pending	20 %





Pipe Conveyer progress

PLANTATION AT PLANT SITE





Plantation at Plant area

GREEN BELT AT MINES AREA



Plantation area at Mines site



Plantation area at Mines site

IN HOUSE NURSERY DEVELOPMENT

JK Lakshmi Cement Ltd has inhouse nursery at plant and mines area, in which near about 29,500 plants are being developed for the future plantation work. The separate team has deputed for the regular maintenance of the plants developed in the nursery.



PLANTATION EVALUATION REPORT

PLANTATION DETAILS- YEAR 2011-17

Lime Stone Mines Area

Year	Location	Quantity	Year Total	SPECIES	AREA IN HECTARE	SURVIVAL RATE	Health of Plant
2011-12	HARDI ROAD LEASE BOUNDRY	3200	7814	GULMOHAR, SISSUM, KARANJ	2.9	70%	Good
	FRUIT GARDEN NEAR MINES OFFICE	1784		JAMUN, MANGO, AMLA	1.6	80%	Good
	PLANTATION AT LAKSHMI VATIKA FRUIT GARDEN	2830		BADAM, AMLA, SEHTUT, JAMUN, AMLA, CHIKU, LEMON, GAVA, CHITWAN, SIRSA, NEEM, KATHAL	2.5	75%	Good
2012-13	MINES OFFICE NURSERY AREA	3130	6590	JAMUN, GULMOHAR, SIRSA, KARANJ, SISSUM, NEEM	2.8	70%	Good
	MACAZINE AREA	3460		GULMOHAR, JATORFA, KARANJ, SISSUM	1.1	65%	Normal
2013-14	PLANTATION NEAR BARGAD TREE AREA	2220	11170	SISSUM, KARANJ, KACHNAR	2.0	75%	Good
	BLOCK PLANTATION -1 ALONG PIPE CONVEYER	7800		KACHANAR, SISSUM, CASSIA, PELTAFORUM, KARANJ, SIRSA, ARJUN	7.0	60%	Normal
	PLANTATION NEAR CRUSHER	1150		COCONUT, CHITWAN, PELTA FORUM	1.0	70%	Good
2014-15	LIMES STONE CRUSHER RAMP	2130	10170	SIRSA,SISSUM, GULMOHAR,KARANJ, KACHNAR	1.9	70%	Good
	NANDINI ROAD	2240		SISSUM, GULMOHAR	2.0	75%	Good
	BLOCK PLANTATION -2 ALONG PIPE CONVEYER	5800		SISSUM, CASSIA,GULMOHAR, KACHANAR, PELTAFORUM, KARANJ, SIRSA, ARJUN	5.2	70%	Normal
2015-16	MINES LC-01	2650	10020	GULMOHAR, SISSUM, KARANJ, KACHNAR	2.4	70%	Good
	PLANTATION NEAR ASSEMBLY POINT	1810		ASHOK, CHITWAN, PELTA FORUM	1.6	75%	Good

	BLOCK PLANTATION -3 ALONG PIPE CONVEYER	3700		SISSUM, CASSIA, KACHANAR, GULMOHAR PELTAFORUM, KARANJ, SIRSA, ARJUN	3.3	70%	Good
	MINES WEIGH BRIDGE AREA	1860		GULMOHAR, SIRSA, SISSUM, KARANJ	1.7	70%	Good
2016-17	PLANTATION NEAR CRUSHER RAMP TTO WEIGH BRIDGE	7680	11409	NEEM, ARJUN, SISSUM, CASSIA, KACHANAR, GULMOHAR, PELTAFORUM, KARANJ, SIRSA	7.0	75%	Good
	PLANTATION AT LEASE BOUNDRY TOWARDS NANDANI VILLAGE	1126		GULMOHAR, SIRSA, SISSUM, KARANJ	1.0	75%	Normal
	PLANTAION AT SEMERIA MINES BOUDARY	2603		GULMOHAR, KACHANAR	2.4	73%	Normal
2017-18	BOUNDARY TOWARDS NANDINI KHUNDINI VILLAGE 5 JUNE 17	5800	20712	JAMUN, ARJUNE,KARANZ, KESIA, KACHNAR, CHITWAN, UKELIPTUS NEEM AMRUD, AWALA, GULMOHAR, PELTRAFORM, SHIRSA, SHISHU, KHAIR	5.3	70%	Good
	Mines Road Pipe Conveyer Area	8052		RJUNE,KARANZ, CASSIA, KACHNAR, CHITWAN, NEEM AMRUD, AWALA, GULMOHAR, PELTRAFORM,	7.3	75%	Good
	Mining Lease Boundary	6860		JAMUN, ARJUNE,KARANZ, CASSIA, KACHNAR, CHITWAN, NEEM AMRUD, AWALA, GULMOHAR, PELTRAFORM,	6.2	70%	Normal
A	Total Plantation	77885	77885		70.8	72%	

PLANTATION DETAILS- YEAR 2011-17

Plant Area

Year	Location	QTY	Total	SPECIES	AREA IN HECTARE	SURVIVAL RATE	Health of Plant
2011-12	Near Anad Badi	2160	6280	MANGO, KATHAL, CHIKU, KACHNAR, GULMOHAR, CHITWAN,	1.9	80%	Good
	Plantation Near Main Road From Main Gate To Packing Plant	2130		GULMOHAR, KACHNAR, SIRSA, KHAMHAR	1.9	70%	Good
	Plantation At Gdcl Colony	1460		ARJUN, GULMOHAR, KACHNAR	1.3	75%	Good
	Plantation Near Environment Lab	530		CHITWAN, KADAM, SIRSA, CHIKU, MANGO, GAVA, BADAM	0.5	70%	Good
2012-13	Plantation At Water Tank Boundry Wall To Khalsa Yard	1930	10556	KARANJ, JAMUN, GULMOHAR	1.7	70%	Good
	Plantation Along Main Gate Left Side	3310		ARJUN, GULMOHAR, JAMUN, KARANJ, SISSUM, PELTA FORUM, SIRSA	3.0	70%	Good
	Plantation Along Lime Stone Conveyer Belts	1516		GULMOHAR, KACHNAR, PELTO PHORUM, CASSIA SEMIA	1.4	75%	GOOD
	Plantation Near Car Parking Area	740		KADAM, ASHOK, GULMOHAR, BOTTLE PALM, CHITWAN	0.7	70%	Good
	Plantation Along The Boundary Towards Malpuri Village	1630		KARANJ, GULMOHAR, SIRSA, SISSUM	1.5	75%	Good
	Plantation At Notch Area	1430		GULMOHAR, KHAMHAR, SIRSA, NEEM	1.3	70%	Normal
2013-14	Plantation At RABH Office Area	2157	10847	GULMOHAR, JAMUN, KARANJ, SISSUM, PELTA FORUM	1.9	70%	Good
	Plantation Along The Plant Main Road Right Side	7460		ARJUN, SIRSA, KACHNAR, GULMOHAR, PELTO PHORUM, KARANJ	6.7	75%	Good
	Plantation Along The Guest House Boundary Wall	1230		GULMOHAR, KHAMHAR, SIRSA, NEEM	1.1	70%	Good
2014-15	Plantation At Boundary Wall Near Rain Water Harvesting Pond	4260	10800	GULMOHAR, KARANJ, SISSUM, KARANJ, PELTA FORUM	3.8	65%	Normal

	Plantation At Boundary Wall From Hazibaba Yard To Jayashree Batching Plant	2960		KARANJ, JAMUN, GULMOHAR	2.7	70%	Normal
	Plantation Near Sewage Treatment Plant	3450		GULMOHAR, JAMUN, KARANJ, SISSUM, PELTO FORUM	3.1	75%	Good
	Road Divider From Main Gate To RABH	130		BOTTLE NECK PALM	0.1	80%	Good
2015-16	Canal Gate Area	5010	17665	ASHOK, CHITWAN, PELTA FORUM	4.5	75%	Good
	Plantation Along Coal Storage Shade	1340		GULMOHAR, PELTO PHORUM, CASSIA SEMIA, KHAMHAR, KAHCNAR	1.2	70%	Good
	Plantation Near Canteen Area	363		ARJUN, PELTA PHORUM, GULMOHAR, CASSIA	0.3	70%	Good
	Plantation At Gypsum Storage Yard	1340		CHITWAN, PELTA PHORUM, GULMOHAR, CASSIA	1.2	65%	Normal
	Plantation At Packing Plant Area	3780		KACHNAR, CASSIA SEMIYA, GULMOHAR, BAMBOO	3.4	75%	Good
	Plantation Near CCR Building	1690		BOTTLE BRUSH, PALM, COCONUT, GULMOHAR, CASSIA, KACHNAR,	1.5	80%	Good
	Plantation Near Slag Mill	160		PELTA PHRUM, KACHNAR, GULMOHAR	0.1	70%	Good
	Plantation Near Gypsum Hopper Ramp	860		CASSIA, CHITWAN, GULMOHAR	0.8	70%	Good
	Plantation At Cooling Tower	158		PELTA PHRUM, KACHNAR, GULMOHAR	0.1	75%	Good
	Plantation At Rabh Chimney	278		PELTA PHRUM, KACHNAR, GULMOHAR	0.3	80%	Good
	Plantation At Notch To Slag Storage Shed Boundary	1390		GULMOHAR, KHAMHAR, SIRSA, KACHNAR	1.3	70%	Good
	Hajibawa Old Office To Switch Yard	1296		GULMOHAR, KHAMHAR, SIRSA, NEEM	1.2	65%	Normal
2016-17	Plant Main Gate To New Truck Parking Area Road	1370	5112	ASHOK, GULMOHAR, CHITWAN, PELTA FORUM	1.2	70%	Good
	Plantation Along Coal Dump Hopper Ramp	175		JAMUN, PELTA FORUM, GULMOHAR	0.2	70%	Good
	Plantation At Canal Gate Boundary And Pond Side	1232		ASHOK, BOTTLE PALM, CHAMPA, BOTTLE BRUSH	1.1	80%	Good
	Govt Railway Side	60		GULMOHAR, NEEM, JAMUN, KACHNAR, DHANBAHAR	0.1	76%	Good

	Near Of Guest House	535		JAMUN AAM, BAMBOO,GULMOHAR, NEEM	0.5	80%	Good
	Boundary Side	1740		GULMOHAR, KACHNAR,KARANJ, ARJUN	1.6	78%	Good
2017-18	Cricket Ground	42	5776	MOLSRI, PELTAFORUM & GULMOHAR	0.04	65%	NORMA L
	Coal Dump Hopper	818		MAHOGANI, SPATHODIA, ULMOHAR, PELTOFORUM, SIRAS, NEEM, ARJUN, BADAM SITAFAL	0.7	75%	Good
	Slag Stacker & Reclaimer Shed	1683		NEEM, PELTOFORUM, MAHOGANI, SPATHODIA SIRAS, SHISHAM	1.5	75%	NORMA L
	Gypsum Dump Hopper Area	2040		SIRAS, ARJUN, SITAFAL, GULMOHAR, NEEM, SPATHODIA, C. SIAMEA, KARANJ, ARJUN, GULMOHAR, PELTOFORUM, ARJUN, GULMOHAR, PELTOFORUM, MAHOGANI, KARANJ, NEEM	1.9	75%	GOOD
	Boundary From Slag Shed To Malpuri Gate	833		NEEM, PELTOFORUM, MAHOGANI, SPATHODIA SIRAS, SHISHAM	0.8	70%	Good
	BIS Security Barack	360		MOHGANI	0.3	70%	
B		67036			60.5		
	Total Plantation (Plant and Mines)	144961					

CSR EXPENDITURE
From April 17 to March 2018

Sr. No	Operational Area	2017-18
		Expen
1	Eradicating hunger, poverty and malnutrition, promoting preventive health care and sanitation including contribution to the Swach Bharat Kosh set up by the central govt. for the promotion of sanitation and making available safe drinking water	20.42
2	Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and the differently able and livelihood enhancement projects	16.87
3	Promoting gender equality, empowering women, setting up homes and hostels for women and orphans; setting up old age homes, day care centres and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups	0.91
4	Protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art; setting up public libraries; promotion and development of traditional arts and handicrafts	1.67
5	Rural development projects	5.32
	Total	45.21

MAJOR CSR ACTIVITIES

A. EDUCATION INTERVENTION

- Special classes of comparatively weak students at Nearby 07 Villages and Recognition of Meritorious Students.

B. INFRASTRUCTURE TO SCHOOL:

- Construction of 02 class room at Nandini Khundani Higher secondary school. E-classroom at Nandini Khundani Higher secondary school, Distribution of Fans and benches to the schools, Construction of boundary wall at Pitoura School

C. VOCATIONAL TRAININGS TO YOUTH

- Classes on English and personality development for youth. Summers camps like, Mehendi classes, painting classes, Computer literacy classes for the students,

D. COMMUNITY LIBRARY

- Establishment of Community library at Nandini Village

E. MEDICAL AND HEALTH CARE

- Organization of 24 free medical camps by specialized doctor per month & 12 specialized camps (pediatrician and gynecologist) to improve the maternal health and reduce the child mortality.
- **Health Awareness Programs** : On seasonal diseases like Dengue fever, malaria, Hepatitis, typhoid, diarrhea, Chikungunya etc. and Blood Donation Camps Donated 440 units of blood in 2017 & 253 units 2016
- **HIV Awareness Programs**: Organized health check up, HIV check up & awareness programs
- **Disease Control** : Monthly Fogging to control malaria and mosquito growth
- **Adaptation of Anganbadi Centre**: JK Lakshmi Cement Ltd has adopted Anganbadi centers in nearby 08 Villages
- **Veterinary Camps And Animal Health Care** : Organization of veterinary camps where more than 1867 cattle got benefited.

F. RURAL SANITATION

- Construction of School Toilet : Construction of 03 No of school toilet and renovation of 01 no of school toilet
- Construction of Bathing Plinth : Construction of 03 no of Bathing plinth
- Garbage Collection : Collection of garbage from Ahiwara, Ghikuria, Pitaoura and Nandini Khundini by 03 no of state of Art garbage tipper provided by JKLC.
- Awareness Campaign on personal Hygiene during menses
- Installation of Sanitary Napkin Vending Machine and Incinerator at 4 no of Girls Toilets.

G. WOMEN EMPOWERMENT

- **Literacy Centers**: Literate More than 240 ladies in 03 no of adult literacy centre
- **Self Help Group (SHG) formation** : **Formation of** 09 Self Help Groups
- **Silai Kadhai Centers** : Empowered more than 592 women in 06 training centre
- **Beautician Training**: One month beautician training program to trained 210 no of girls and women in nearby villages.

H. PROMOTION OF SPORTS:

- Red Soil filling and Levelling of Play ground at Nandini Khundani Higher Secondary School, Construction of Kabaddi ground at Ahiwara Higher secondary School, Construction of Badminton Ground at Balodyan, Nandini

I. DRINKING WATER AVAILABILITY

- 15 (Fifteen) no. of bore well are made in Govt. Schools, and nearby 8 villages for drinking water availability., Installation of water pumps at Panchayat bhawan and schools for the drinking water availability. For the drinking water availability 03 no of water huts Constructed in nearby villages

J. SOLAR POWERED STREET LIGHTS

- 15 No of Solar Powered Street Lights at Nearby Villages
- 01 no of solar powered street light installed at Veterinary Hospital Ahiwara.

K. Infrastructure to Villages

- Construction of Boundary wall of Girhola Satnami Temple
- Repairing of road from Canal Crossing to Hatkhoj umda
- JKLC have constructed & repaired village approach road of Malpuri Khurd
- Construction of Shitla Temple at Nandni Khundani Village
- Official material provided to the new Tehasil office Ahiwara.
- Removal of silt from the canal in Khasadih minor & Construction of fencing wall at Girls school Ahiwara etc
- Installation of Cow Catcher For treatments of the cattle at Semaria, Girhola village
- Installation of Fans at Panchayat Bhawans and community hall
- Construction of Water Shed at Veterinary Hospital Ahiwara

L. CULTURAL UPLIFTMENT

- Financial supports were also given to the villagers to organize the religious and cultural programs like Ganpati festival, Durga pooja etc.
- Construction of Cultural program platform at Girhola village, Satnami Temple.

M. DISASTER MANAGEMENT

- JKLC Durg has always responded promptly, whenever any incidents of fire have been reported from any of the surrounding villages. We have rushed our "Fire Tender" along with trained fire personnel in all such cases of emergencies.

N. ENVIRONMENT

- **Harihar Chhattisgarh Plantation:** Plantation of total 36,280 plants in nearby villages.
- **Environment Awareness:** Awareness Programs for students on World Environment day, Ozone Day, Water day, Earth day & Mines Environment Week etc. Awareness program on ground water conservations were also organized for the school students.
- **Soak Pit Construction for water conservation:** Construction of 05 no of soak pits in Girhola, Ahiwara, Pitoura, and Ghikuriya & Semaria Village.
- **Deepening of village pond :** Deepening of village pond done at Ghikuriya village & Construction of rain water harvesting units

ENVIRONMENTAL STATUS REPORT

(Half-yearly Report for October-2017 to March-2018)

for

INTEGRATED CEMENT PLANT

of

M/s JK LAKSHMI CEMENT LIMITED

at

**Village-Malpuri Khurd & Khasadih,
Dist-Durg (C.G.)**



Prepared By



MAHARASHTRA ENVIRO POWER LIMITED

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web: smsl.co.in, mail: vijay.gupta@smsl.co.in

Lab.: 'MoEF recognized & NABL Accredited Environmental Laboratory'
CHW-01, Mouza-Mandwa, MIDC Industrial Area
Butibori, Dist. Nagpur

MARCH - 2018



'MoEF' RECOGNIZED ENVIRONMENTAL LABORATORY
VALIDITY UPTO 08.02.2022

जहाँ है हरियाली।
वहाँ है खुशहाली।।



FOREWORD

To maintain the environmental quality standards, protection of environment is a very essential task for any Industrial or mining activity. Compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding of the cement plant; therefore environment protection is becoming a prerequisite for sustainable development. To fill the requirement, the management of **M/S JK Lakshmi Cement Ltd.** has adopted a corporate responsibility of environment protection.

To comply with the Environment protection act, to fulfill statutory requirements and to be in tuned with Environmental Preservation and sustainable development, **M/S JK Lakshmi Cement Ltd.** has appointed MAHARASHTRA ENVIRO POWER LIMITED, NAGPUR as Environment Consultant for various Environmental issues related to their cement plant.


Plant is operational and production is going-on. This report presents the '**Environmental Status**' for the period **October-2017 to March-2018** (half-yearly report) as compliance to the statutory requirements.

The co-operation of Staff and Management of **M/S JK Lakshmi Cement Ltd.** during the work execution period is gratefully acknowledged.

For **MAHARASHTRA ENVIRO POWER LIMITED,**

Place : NAGPUR
Date : 07.04.2018




Dr. D. G. BATTALWAR
Authorized Signatory



Site Off. : CHW01, Mandwa, Butibori Ind. Estate, Butibori, Nagpur.
Landline M. : 8805947186, 9923037416

MAHARASHTRA
ENVIRO POWER LIMITED

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1.0 INTRODUCTION

This Summarized Environmental Baseline Data report represents the environmental status regarding Micro-meteorological Data, Ambient Air Quality, Noise Level (Day & Night), Stack Emission Quality, Water (Surface & Ground) Quality and Soil Quality in & around the **Integrated Cement Plant** of **M/s JK Lakshmi Cement Limited** at village- Semaria, Ghikuria & Nandini-Kundini, Distt. Durg (C.G.).

This report has been prepared on basis of data collected during environmental monitoring & sample collection in & around the Integrated Cement Plant area for the period **October-2017 to March-2018**.

2.0 SUMMARIZED ENVIRONMENTAL BASELINE DATA FOR PERIOD OCTOBER-2017 TO MARCH-2018

Regular environmental monitoring in & around the Integrated Cement Plant area is carried out. 'Summarized Environmental Baseline Data' for the period October-2017 to March-2018 is presented below.

2.1 MICRO-METEOROLOGICAL DATA

2.1.1 OBSERVATION

Micro-meteorological data regarding wind speed, wind direction, temperature, relative humidity, solar radiation, atmospheric pressure and rainfall collected from IMD station at Plant site of M/s JK Lakshmi Cement Limited on hourly/daily basis. Data is summarized for individual parameters for respective month and tabulated below in **Table– 2.1**. Respective graphical presentations are also stated for tabulated values.

TABLE – 2.1:
Micro-Meteorological Data for Period October-2017 to March-2018

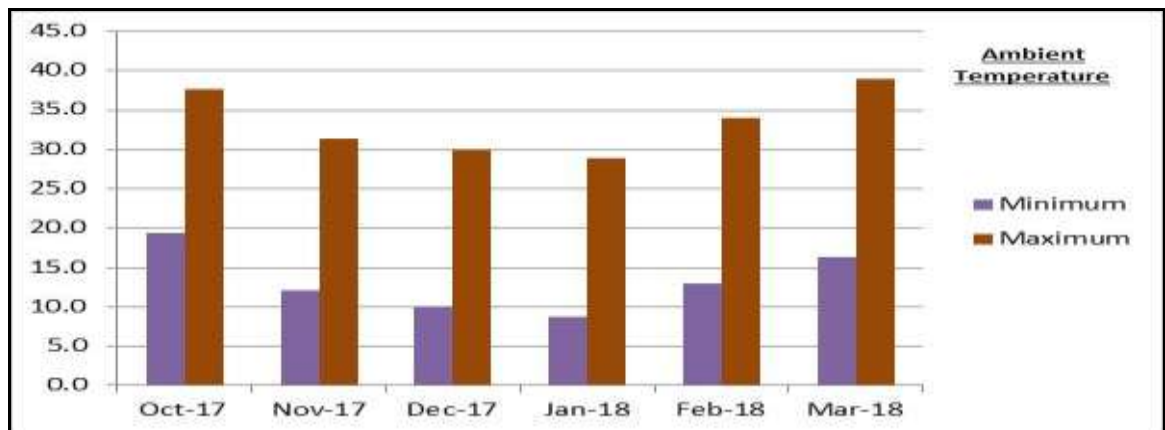
Sr. No.	Months	Minimum	Maximum
WIND SPEED (km/hr)			
1.	October - 2017	0.0	3.0
2.	November - 2017	0.0	3.2
3.	December - 2017	0.0	3.1
4.	January - 2018	0.0	2.9
5.	February - 2018	0.0	7.7
6.	March - 2018	0.0	3.1
AMBIENT TEMPERATURE (°C)			
1.	October - 2017	19.4	37.6
2.	November - 2017	12.1	31.4
3.	December - 2017	10.1	29.9
4.	January - 2018	8.8	28.9
5.	February - 2018	12.9	34.0
6.	March - 2018	16.3	38.9

table contd...

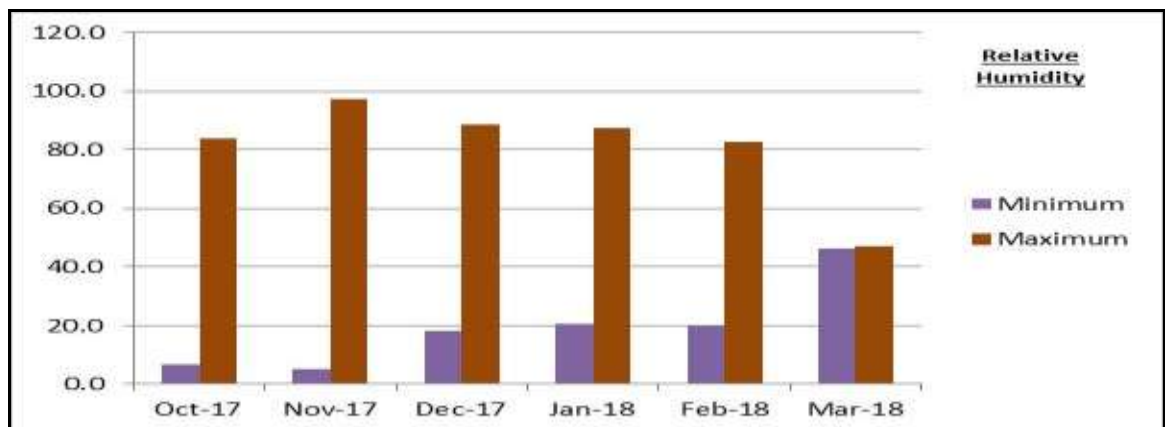
table contd...

RELATIVE HUMIDITY (%)			
1.	October - 2017	6.8	83.9
2.	November - 2017	5.1	97.4
3.	December - 2017	18.4	88.5
4.	January - 2018	20.5	87.4
5.	February - 2018	19.9	82.7
6.	March - 2018	46.1	47.0
ATMOSPHERIC PRESSURE (mm-Hg)			
1.	October - 2017	650.4	729.7
2.	November - 2017	706.8	852.0
3.	December - 2017	823.1	836.9
4.	January - 2018	823.3	833.6
5.	February - 2018	822.8	909.6
6.	March - 2018	908.6	909.8

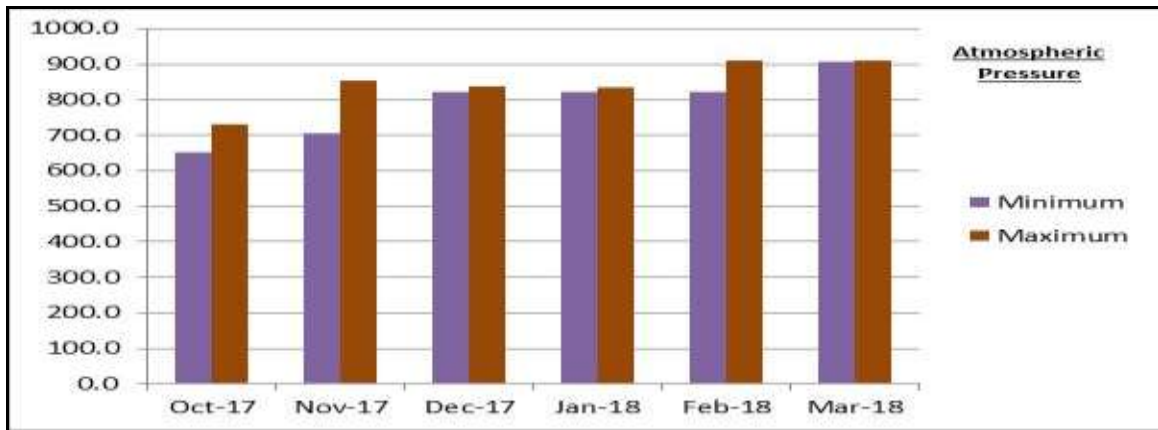
Graphical Presentation of Ambient Temperature



Graphical Presentation of Relative Humidity



Graphical Presentation of Atmospheric Pressure



2.1.2 RESULTS AND DISCUSSION

Total **rainfall** for the period October-2017 to March-2018 was 60.6 mm and out of which, 48.9 mm rainfall was found in month October-2017.

Mostly **wind** was found calm (<1.0 km/hr) and maximum time wind was predominated from W-SW direction during period October-2017 to March-2018. Maximum wind speed was observed in month of February-2018 and speed was 7.7 km/hr.

Ambient **temperature** was monitored on hourly basis for minimum & maximum during period October-2017 to March-2018. Observed minimum temperature was 8.8 °C in month January-2018 and maximum temperature was 38.9 °C in month March-2018.

Relative **humidity** was monitored on hourly basis for minimum & maximum during period October-2017 to March-2018. Observed minimum humidity was 5.1% in months November-2017 and maximum humidity was 97.4% also in month November-2017.

Atmospheric pressure was monitored on daily basis during period October-2017 to March-2018. Observed minimum atmospheric pressure was 650.4 mm-Hg in month October-2017 and maximum atmospheric pressure was 909.8 mm-Hg in months March-2018.

2.2 AMBIENT AIR QUALITY (AAQ)

Monitored Ambient Air Quality values (parameter-wise) in & around the plant site for the period October-2017 to March-2018 are given below in **Table- 2.2** to **Table- 2.6**.

TABLE – 2.2: PM₁₀ Particulate Matter (<10 µm)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	42.8	46.4	43.1	47.3	51.1	53.9	42.8	53.9	47.4	53.6
AAQ-2	Boundary towards North-East Direction	41.3	43.6	40.4	45.6	47.4	50.5	40.4	50.5	44.8	50.2
AAQ-3	Boundary towards East Direction	45.4	48.2	46.7	49.8	53.3	58.4	45.4	58.4	50.3	57.9
AAQ-4	Boundary towards North Direction	39.7	44.1	41.3	43.5	48.2	51.6	39.7	51.6	44.7	51.3
AAQ-5	Boundary towards South West Direction	41.5	45.7	42.2	45.7	49.4	52.8	41.5	52.8	46.2	52.5

TABLE – 2.3: PM_{2.5} Particulate Matter (<2.5 µm)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	24.3	27.5	25.4	26.4	29.8	31.5	24.3	31.5	27.5	31.3
AAQ-2	Boundary towards North-East Direction	22.7	25.2	24.3	24.3	27.5	30.2	22.7	30.2	25.7	29.9
AAQ-3	Boundary towards East Direction	24.1	26.6	27.2	27.7	28.9	33.6	24.1	33.6	28.0	33.1
AAQ-4	Boundary towards North Direction	21.5	24.4	22.6	23.2	26.6	28.3	21.5	28.3	24.4	28.1
AAQ-5	Boundary towards South West Direction	23.8	26.1	24.5	25.6	28.3	30.8	23.8	30.8	26.5	30.6

TABLE – 2.4: Sulphur Dioxide (SO₂)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	13.4	14.6	15.1	17.8	16.2	15.4	13.4	17.8	15.4	17.6
AAQ-2	Boundary towards North-East Direction	12.5	13.9	14.8	18.1	16.4	14.3	12.5	18.1	15.0	17.9
AAQ-3	Boundary towards East Direction	13.7	15.3	16.4	18.5	16.9	14.7	13.7	18.5	15.9	18.3
AAQ-4	Boundary towards North Direction	14.3	16.2	17.5	19.7	17.5	15.1	14.3	19.7	16.7	19.5
AAQ-5	Boundary towards South West Direction	13.1	14.7	16.2	18.3	16.8	14.6	13.1	18.3	15.6	18.2

TABLE – 2.5: Oxides of Nitrogen (NO_x)

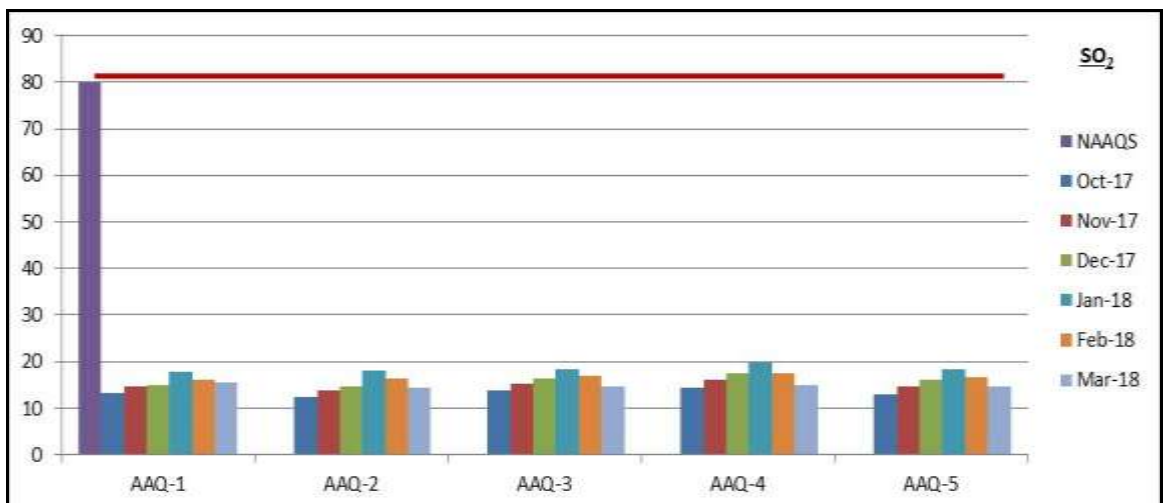
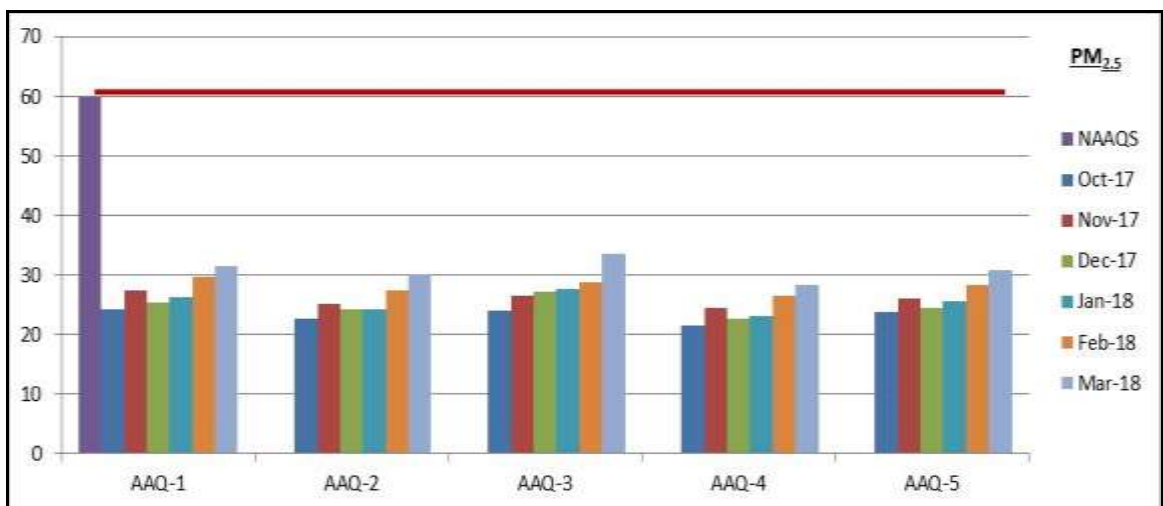
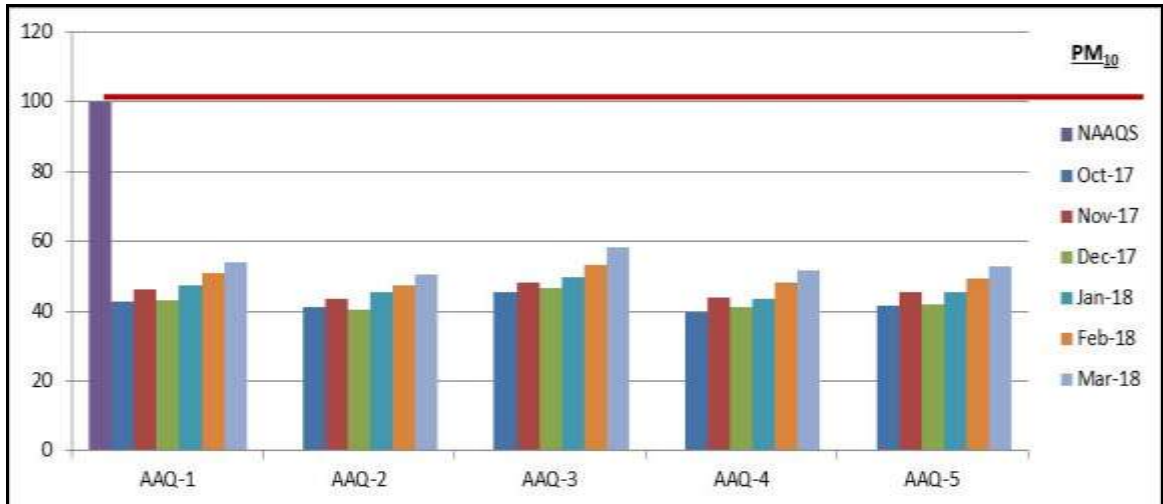
Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	15.7	17.3	18.1	20.2	18.9	18.3	15.7	20.2	18.1	20.1
AAQ-2	Boundary towards North-East Direction	16.9	18.5	18.8	21.6	20.1	19.5	16.9	21.6	19.2	21.5
AAQ-3	Boundary towards East Direction	14.6	16.1	17.4	18.7	17.5	16.2	14.6	18.7	16.8	18.6
AAQ-4	Boundary towards North Direction	15.2	17.8	18.6	19.5	18.2	17.4	15.2	19.5	17.8	19.4
AAQ-5	Boundary towards South West Direction	14.8	16.4	17.7	18.9	17.6	16.1	14.8	18.9	16.9	18.8

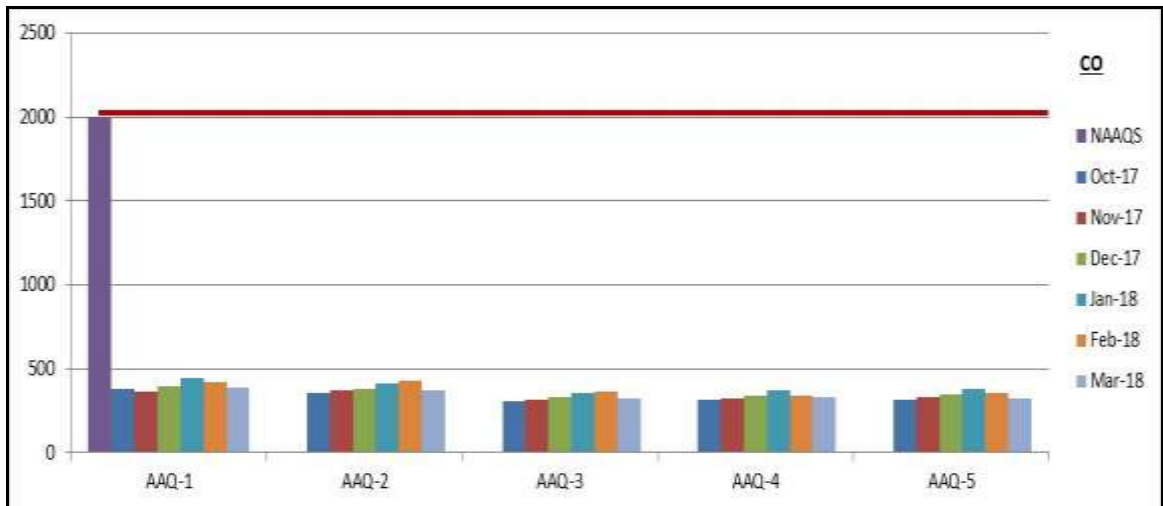
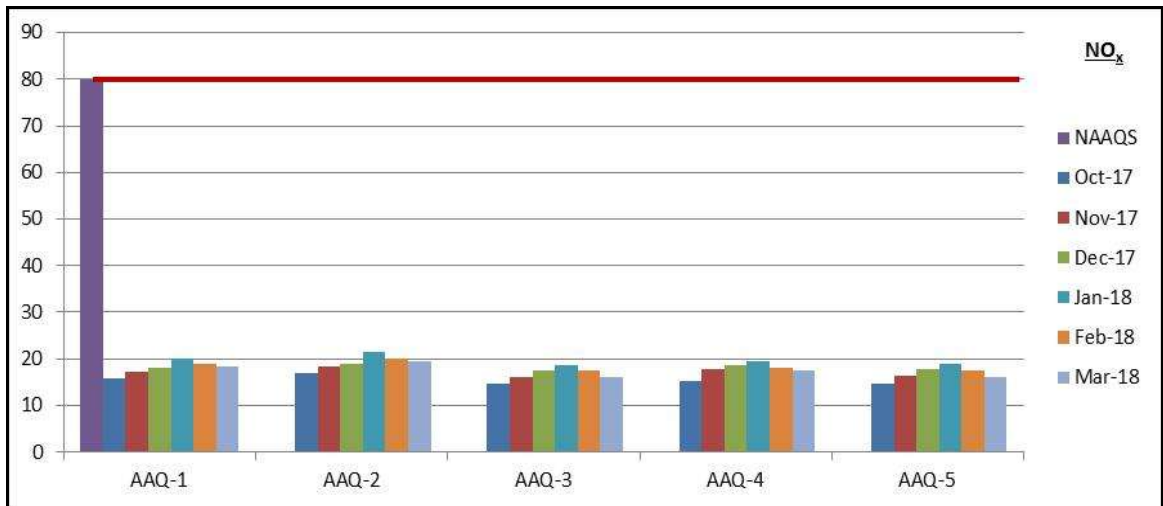
TABLE – 2.6: Carbon Monoxide (CO)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	381	364	397	442	418	385	364	442	398	440
AAQ-2	Boundary towards North-East Direction	354	371	383	411	426	372	354	426	386	425
AAQ-3	Boundary towards East Direction	305	319	334	354	367	323	305	367	334	366
AAQ-4	Boundary towards North Direction	312	328	341	369	344	331	312	369	338	367
AAQ-5	Boundary towards South West Side	319	333	347	378	353	326	319	378	343	376

The graphical presentations (parameter-wise) of above observations are presented below in **Figure – 2.1**.

Figure – 2.1: GRAPHICAL PRESENTATION (Parameter-wise)





2.2.1 FUGITIVE DUST EMISSION MONITORING (µg/m³)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
ST- 1	Near Raw Mill Hopper	230.6	310.2	324.8	355.8	374.9	364.2
ST- 2	Near Raw Mill	234.4	268.8	312.0	333.4	362.9	354.1
ST- 3	Near Coal Mill	268.2	254.2	305.8	325.8	355.8	344.6
ST- 4	Near Cement Mill Hopper	296.4	336.4	366.0	374.6	368.6	390.4
ST- 5	Near Cement Mill	268.1	311.2	323.6	345.7	364.9	363.3
ST- 6	Near Clinker Loading Hopper	338.3	346.2	368.0	374.2	388.2	394.1
ST- 7	Near Coal Stacker	318.6	353.6	364.6	375.6	359.4	362.4
ST- 8	Near Lime Stone Stacker	298.2	313.4	340.6	324.7	360.6	374.4
ST- 9	Near Slag Stacker	322.1	333.4	341.8	348.2	370.6	366.9
ST- 10	Near Packing Plant	254.6	268.2	326.0	341.6	348.7	356.4

2.2.2 RESULTS & DISCUSSION

These monitored values represent quite satisfactory condition regarding Air Quality in & around the mine lease area in comparison of the National Ambient Air Quality standards (NAAsQS) and Fugitive dust emission standard.

2.3 NOISE LEVEL

Noise Levels in & around the plant site are monitored on regular basis in day & night hours separately. Summarized observed values of Noise Level for the period October-2017 to March-2018 are given below in **Table-2.7** & **Table-2.8**.

TABLE – 2.7: NOISE LEVEL (DAY HOURS)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG
NL – 1	Boundary towards West Direction	57.8	58.2	55.4	48.9	49.4	51.6	48.9	58.2	53.6
NL – 2	Boundary towards North-East Direction	69.5	68.7	69.2	50.5	51.8	53.2	50.5	69.5	60.5
NL – 3	Boundary towards East Direction	52.1	50.5	51.3	47.7	48.5	49.3	47.7	52.1	49.9
NL – 4	Boundary towards North Direction	59.2	57.8	54.6	49.4	50.7	52.1	49.4	59.2	54.0
NL – 5	Boundary towards South West Direction	49.4	47.6	45.9	46.2	47.5	49.4	45.9	49.4	47.7

TABLE – 2.8: NOISE LEVEL (NIGHT HOURS)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG
NL – 1	Boundary towards West Direction	52.4	49.7	50.8	45.6	46.3	48.5	45.6	52.4	48.9
NL – 2	Boundary towards North-East Direction	68.9	68.1	68.5	45.4	46.6	47.8	45.4	68.9	57.6
NL – 3	Boundary towards East Direction	49.6	48.2	47.4	42.9	43.5	44.3	42.9	49.6	46.0
NL – 4	Boundary towards North Direction	51.7	50.6	48.2	44.6	45.2	46.8	44.6	51.7	47.9
NL – 5	Boundary towards South West Direction	43.5	42.3	41.7	41.5	42.7	44.2	41.5	44.2	42.7

2.3.1 RESULTS & DISCUSSION

In comparison of the prescribed National Ambient Noise Level Standards, the observed values of Noise level are well within stipulated limits prescribed for industrial/commercial/residential area. The monitored values represent quite satisfactory condition regarding Noise pollution in & around the plant site.

2.4 STACK EMISSIONS

Operations of different unit stacks are going-on and monitoring was carried out for emissions. All stacks have been monitored during reporting period from October-2017 to March-2018 for required parameters. Month-wise results are presented in **Table- 2.9A, Table- 2.9B & Table- 2.9C.**

TABLE – 2.9A: STACK EMISSION ANALYSIS REPORT

Particulars	Unit	Stack #1	Stack #2	Stack #3	Stack #4	Stack #5	Stack #6	Consent Status
Stack Attached with	-	Raw Mill RABH	Clinker Cooler ESP	Coal Mill Bag House	Cement Mill-1 Bag House	Cement Mill-2 Bag House	Slag Mill Bag House	
Stack Height	meter	64.0	43.0	57.7	56.1	56.1	48.0	-
Stack Inner Dia	meter	6.0	3.55	2.8	1.4	1.4	4.3	-
October-2017								
Ambient Temperature	°C	32.0	34.0	34.0	34.0	33.0	32.0	-
Flue Gas Temperature	°C	109.0	231.0	74.0	79.0	79.0	78.0	-
Velocity	m/s	6.7	7.5	6.9	6.8	7.1	7.3	-
Total Volumetric Flow	Nm ³ /sec	162.8	63.1	37.8	9.3	9.7	94.3	-
Total Particulate Matter (TPM)	mg/Nm ³	23.7	28.2	26.3	25.1	26.5	28.2	<30.0
November-2017								
Ambient Temperature	°C	29.0	30.0	30.0	29.0	30.0	30.0	-
Flue Gas Temperature	°C	104.0	128.0	73.0	77.0	75.0	75.0	-
Velocity	m/s	6.7	7.8	6.7	6.9	6.7	7.1	-
Total Volumetric Flow	Nm ³ /sec	162.8	65.6	36.7	9.4	9.2	91.7	-
Total Particulate Matter (TPM)	mg/Nm ³	25.2	27.8	26.4	25.5	26.1	27.4	<30.0

TABLE – 2.9B: STACK EMISSION ANALYSIS REPORT

Particulars	Unit	Stack #1	Stack #2	Stack #3	Stack #4	Stack #5	Stack #6	Consent Status
Stack Attached with	-	Raw Mill RABH	Clinker Cooler ESP	Coal Mill Bag House	Cement Mill-1 Bag House	Cement Mill-2 Bag House	Slag Mill Bag House	
Stack Height	meter	64.0	43.0	57.7	56.1	56.1	48.0	-
Stack Inner Dia	meter	6.0	3.55	2.8	1.4	1.4	4.3	-
December-2017								
Ambient Temperature	°C	28.0	31.0	30.0	29.0	30.0	29.0	-
Flue Gas Temperature	°C	109.0	232.0	75.0	79.0	78.0	78.0	-
Velocity	m/s	6.9	7.1	6.8	6.6	6.8	7.1	-
Total Volumetric Flow	Nm ³ /sec	167.7	59.7	37.2	9.0	9.3	91.7	-
Total Particulate Matter (TPM)	mg/Nm ³	25.5	27.3	26.1	25.8	27.1	28.8	<30.0
January-2018								
Ambient Temperature	°C	28.0	31.0	30.0	30.0	31.0	29.0	-
Flue Gas Temperature	°C	107.0	229.0	75.0	72.0	74.0	73.0	-
Velocity	m/s	6.4	7.3	6.8	6.6	6.8	7.1	-
Total Volumetric Flow	Nm ³ /sec	155.5	61.4	37.2	9.0	9.3	91.7	-
Total Particulate Matter (TPM)	mg/Nm ³	22.8	26.5	27.1	24.7	25.2	26.4	<30.0

TABLE – 2.9C: STACK EMISSION ANALYSIS REPORT

Particulars	Unit	Stack #1	Stack #2	Stack #3	Stack #4	Stack #5	Stack #6	Consent Status
Stack Attached with	-	Raw Mill RABH	Clinker Cooler ESP	Coal Mill Bag House	Cement Mill-1 Bag House	Cement Mill-2 Bag House	Slag Mill Bag House	
Stack Height	meter	64.0	43.0	57.7	56.1	56.1	48.0	-
Stack Inner Dia	meter	6.0	3.55	2.8	1.4	1.4	4.3	-
February-2018								
Ambient Temperature	°C	31.0	32.0	30.0	30.0	31.0	31.0	-
Flue Gas Temperature	°C	108.0	234.0	76.0	75.0	73.0	77.0	-
Velocity	m/s	6.5	7.4	6.6	6.7	6.3	6.8	-
Total Volumetric Flow	Nm ³ /sec	158.0	62.2	36.2	9.2	8.6	87.8	-
Total Particulate Matter (TPM)	mg/Nm ³	24.4	26.1	25.8	27.2	23.9	26.6	<30.0
March-2018								
Ambient Temperature	°C	31.0	32.0	31.0	31.0	32.0	33.0	-
Flue Gas Temperature	°C	106.0	239.0	76.0	77.0	78.0	76.0	-
Velocity	m/s	6.6	7.4	6.6	6.9	6.5	6.8	-
Total Volumetric Flow	Nm ³ /sec	160.4	62.2	36.2	9.4	8.9	87.8	-
Total Particulate Matter (TPM)	mg/Nm ³	24.8	28.1	25.3	26.4	25.8	26.2	<30.0

2.4.1 RESULTS & DISCUSSION

The observations show that stack emissions are well within standards prescribed in the 'Consent for Operation'.

2.5 WATER (GROUND & SURFACE) QUALITY

2.5.1 GENERAL

A routine analysis of Water Quality is required to find out any contamination of natural water sources. The plant site is maintaining the ‘Zero Discharge’ condition and Ponds are lined. There is no chance of ground water contamination. However, as per stipulated condition, surface water and ground water quality have monitored for routine parameters.

2.5.2 LOCATION OF WATER QUALITY SAMPLING

The water quality monitoring was selected with a view to check out the impact on ground water sources in and around plant site. Total 05 (five) number, 04 (four) ground water sample and 01 (one) surface water sample from Shivnath river flowing near the plant, were collected and analyzed.

Location of sampling stations is given in **Table – 2.10**.

Table – 2.10: Description of Ground & Surface Water Sampling Stations

Sr. No.	Sampling Stations	Station Code	Approx. Distance from Plant site	Direction from Plant site
1.	Bore well within plant site	GW – 1	Within	-
2.	Bore well in Malpuri village	GW – 2	1.0 km	E
3.	Bore well in Girhola village	GW – 3	1.5 km	N
4.	Bore well in Khasadih village	GW – 4	1.5 km	SW
5.	Shivnath river	SW – 1	5.0 km	NW

2.4.3 OBSERVATIONS

The characteristics of ground water samples and surface water sample for the period December-2017 to March-2018, are presented below in **Table – 2.11 & Table – 2.12**.

TABLE – 2.11: GROUND & SURFACE WATER QUALITY REPORT

Date of Sampling			20.12.2017						
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values				
			Desirable	Permissible	GW-1	GW-2	GW-3	GW-4	SW-1
A.	ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT								
1.	Colour	Hazen	5	15	CL	CL	CL	CL	CL
2.	Odour	UO	AG	AG	AG	AG	AG	AG	AG
3.	Taste	AG	AG	AG	AG	AG	AG	AG	ND
4.	Turbidity	NTU	1	5	< 1.0	< 1.0	< 1.0	< 1.0	2.3
5.	Total Dissolved Solids	mg/l	500	2000	544.0	538.0	542.0	516.0	396.0
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.22	7.13	7.16	7.12	7.89
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.7	3.4	3.5	3.3	7.7
8.	Biochemical Oxygen Demand (BOD) 3 days 27 °C	mg/l	-	-	<3.0	<3.0	<3.0	<3.0	<3.0
9.	Chemical Oxygen Demand (COD)	mg/l	-	-	8.0	8.0	8.0	8.0	12.0
10.	Conductivity	µS/cm	-	-	848.0	842.0	846.0	816.0	628.0
11.	Total Alkalinity as CaCO ₃	mg/l	200	600	204.0	216.0	196.0	188.0	164.0
12.	Total Hardness as CaCO ₃	mg/l	200	600	216.0	204.0	212.0	208.0	162.0
13.	Calcium as Ca ⁺⁺	mg/l	75	200	56.2	53.0	55.1	54.1	42.1
14.	Magnesium as Mg ⁺⁺	mg/l	30	100	18.1	17.1	17.8	17.5	13.6
15.	Chlorides as Cl	mg/l	250	1000	79.0	68.0	73.0	71.0	55.0
16.	Sulphates as SO ₄	mg/l	200	400	52.7	51.5	65.2	57.6	22.4

Table contd...

Table contd...

Sr. No.	Parameters	Unit	As per IS 10500:2012		Values				
			Desirable	Permissible	GW-1	GW-2	GW-3	GW-4	SW-1
17.	Fluoride as F	mg/l	1.0	1.5	0.55	0.61	0.57	0.63	0.11
18.	Nitrates as NO ₃	mg/l	45	NR	6.4	8.3	9.7	8.9	5.1
19.	Iron as Fe	mg/l	0.3	NR	0.16	0.21	0.21	0.19	0.05
20.	Manganese as Mn	mg/l	0.1	0.3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
21.	Zinc as Zn	mg/l	5.0	15.0	BDL	BDL	BDL	BDL	BDL
22.	Copper as Cu	mg/l	0.05	1.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
23.	Aluminium as Al	mg/l	0.03	0.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
24.	Boron as B	mg/l	0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
25.	Total Coliform	MPN/100 ml	Absent	NR	0	0	0	0	70
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	0	11
B.	TOXIC SUBSTANCES								
27.	Cadmium & its Compounds as Cd	mg/l	0.003	NR	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
28.	Arsenic & its Compounds as As	mg/l	0.01	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
29.	Lead & its Compounds as Pb	mg/l	0.05	NR	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
30.	Chromium & its Compounds as Cr	mg/l	0.01	NR	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
31.	Selenium & its Compounds as Se	mg/l	0.01	NR	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
32.	Mercury as Hg	mg/l	0.001	NR	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005

Note: CL- Colorless; UO- unobjectionable; AG- agreeable; NR- no relaxation; BDL- below detectable limit; MPN- most probable number; NR- not determined

TABLE – 2.12: GROUND & SURFACE WATER QUALITY REPORT

Date of Sampling			20.03.2018						
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values				
			Desirable	Permissible	GW-1	GW-2	GW-3	GW-4	SW-1
A.	ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT								
1.	Colour	Hazen	5	15	CL	CL	CL	CL	CL
2.	Odour	UO	AG	AG	AG	AG	AG	AG	AG
3.	Taste	AG	AG	AG	AG	AG	AG	AG	ND
4.	Turbidity	NTU	1	5	< 1.0	< 1.0	< 1.0	< 1.0	1.7
5.	Total Dissolved Solids	mg/l	500	2000	568.0	562.0	574.0	546.0	422.0
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.31	7.19	7.23	7.26	8.06
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.8	3.6	3.6	3.5	7.5
8.	Biochemical Oxygen Demand (BOD) 3 days 27 °C	mg/l	-	-	<3.0	<3.0	<3.0	<3.0	<3.0
9.	Chemical Oxygen Demand (COD)	mg/l	-	-	8.0	8.0	8.0	8.0	12.0
10.	Conductivity	µS/cm	-	-	882.0	876.0	888.0	862.0	664.0
11.	Total Alkalinity as CaCO ₃	mg/l	200	600	210.0	224.0	208.0	202.0	172.0
12.	Total Hardness as CaCO ₃	mg/l	200	600	224.0	216.0	218.0	216.0	168.0
13.	Calcium as Ca ⁺⁺	mg/l	75	200	58.2	56.2	56.7	56.2	43.7
14.	Magnesium as Mg ⁺⁺	mg/l	30	100	18.8	18.1	18.3	18.1	14.1
15.	Chlorides as Cl	mg/l	250	1000	83.0	72.0	78.0	75.0	59.0
16.	Sulphates as SO ₄	mg/l	200	400	56.5	53.8	69.6	59.4	27.1

Table contd...

Table contd...

Sr. No.	Parameters	Unit	As per IS 10500:2012		Values				
			Desirable	Permissible	GW-1	GW-2	GW-3	GW-4	SW-1
17.	Fluoride as F	mg/l	1.0	1.5	0.57	0.64	0.59	0.67	0.14
18.	Nitrates as NO ₃	mg/l	45	NR	6.9	9.5	10.9	11.3	7.6
19.	Iron as Fe	mg/l	0.3	NR	0.17	0.24	0.25	0.22	0.08
20.	Manganese as Mn	mg/l	0.1	0.3	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
21.	Zinc as Zn	mg/l	5.0	15.0	BDL	BDL	BDL	BDL	BDL
22.	Copper as Cu	mg/l	0.05	1.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
23.	Aluminium as Al	mg/l	0.03	0.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
24.	Boron as B	mg/l	0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
25.	Total Coliform	MPN/100 ml	Absent	NR	0	0	0	0	73
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	0	23
B.	TOXIC SUBSTANCES								
27.	Cadmium & its Compounds as Cd	mg/l	0.003	NR	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
28.	Arsenic & its Compounds as As	mg/l	0.01	0.05	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
29.	Lead & its Compounds as Pb	mg/l	0.05	NR	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
30.	Chromium & its Compounds as Cr	mg/l	0.01	NR	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
31.	Selenium & its Compounds as Se	mg/l	0.01	NR	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
32.	Mercury as Hg	mg/l	0.001	NR	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005

Note: CL- Colorless; UO- unobjectionable; AG- agreeable; NR- no relaxation; BDL- below detectable limit; MPN- most probable number; NR- not determined

2.5.4 RESULTS AND DISCUSSION

The results of ground & surface water quality are discussed as per findings and its significance over environment and human being.

Overall quality of water samples are showing the water sources of the area are not polluted except the surface water samples getting contamination from surface run-off or domestic uses. The coliforms values are exception otherwise all the water samples are indicating its characteristics within limit as given in relevant Indian Standards.

Zero discharge condition of waste water from plant site makes the entire area free from water pollution. Overall quality of water samples also presents that the water sources of the area are not polluted.

2.6 SOIL QUALITY

2.6.1 GENERAL

Soil samples were collected from inside & near by location of plant site, so that any adverse impact may be identified.

2.6.2 LOCATIONS OF SOIL MONITORING

Total two soil samples were collected from plant site and village side. Sampling locations have described in **Table – 2.13**.

TABLE – 2.13: DETAILS OF SAMPLING STATIONS OF SOIL ANALYSIS

Sr. No.	Sampling Stations	Station Code	Approx. Distance from plant site	Direction from plant site
1.	Plant Site; (Barren Land)	S - 1	Within	-
2.	Malpuri village; (Agriculture Land)	S - 3	1.0 km	E

2.6.3 OBSERVATIONS

The physico-chemical characteristics of soil sample for the period December-2017 to March-2018 have reported in **Table- 2.14 & Table- 2.15**.

TABLE – 2.14: SOIL QUALITY REPORT

Date of Sampling		20.12.2017		
Sr. No.	Parameters	Unit	S-1	S-2
A.	Physical Properties			
1.	Bulk Density	g/cc	1.32	1.25
2.	Particle Size Distribution	% Gravel	9.6	3.3
		% Sand	34.9	33.8
		% Silt	28.7	31.1
		% Clay	26.8	31.8

Table contd...

Table contd...

Sr. No.	Parameters	Unit	S-1	S-2
3.	Soil Texture	-	Clay Loam	Clay Loam
4.	Porosity	%	42.5	43.9
5.	Water Holding Capacity	%	34.7	38.2
B.	Chemical Properties			
1.	pH at 25 °C	-	7.06	6.84
2.	Electrical Conductivity	mmhos/cm	0.154	0.183
3.	Organic Carbon	%	0.45	0.71
4.	Cation Exchange Capacity	meq/100 gm	26.9	37.3
5.	Exchangeable Calcium as Ca ⁺⁺	mg/kg	48.2	61.8
6.	Exchangeable Magnesium as Mg ⁺⁺	mg/kg	14.6	21.1
7.	Chlorides as Cl	mg/kg	97.3	119.4
8.	Sulphate as SO ₄	mg/kg	105.2	147.5
9.	Nitrogen as N	kg/ha	89.6	321.2
10.	Phosphorous as P ₂ O ₅	kg/ha	68.8	119.3
11.	Potassium as K ₂ O	kg/ha	97.3	274.6

TABLE – 2.15: SOIL QUALITY REPORT

Date of Sampling		20.03.2018		
Sr. No.	Parameters	Unit	S-1	S-2
A.	Physical Properties			
1.	Bulk Density	g/cc	1.31	1.23
2.	Particle Size Distribution	% Gravel	8.3	3.7
		% Sand	35.6	33.1
		% Silt	28.9	31.4
		% Clay	27.2	31.8

Table contd...

Table contd...

Sr. No.	Parameters	Unit	S-1	S-2
3.	Soil Texture	-	Clay Loam	Clay Loam
4.	Porosity	%	41.8	44.4
5.	Water Holding Capacity	%	34.2	38.6
B.	Chemical Properties			
1.	pH at 25 °C	-	7.01	6.78
2.	Electrical Conductivity	mmhos/cm	0.151	0.189
3.	Organic Carbon	%	0.44	0.73
4.	Cation Exchange Capacity	meq/100 gm	26.6	37.6
5.	Exchangeable Calcium as Ca ⁺⁺	mg/kg	47.9	62.3
6.	Exchangeable Magnesium as Mg ⁺⁺	mg/kg	14.5	21.2
7.	Chlorides as Cl	mg/kg	98.6	124.1
8.	Sulphate as SO ₄	mg/kg	103.9	143.4
9.	Nitrogen as N	kg/ha	92.5	346.7
10.	Phosphorous as P ₂ O ₅	kg/ha	67.4	112.5
11.	Potassium as K ₂ O	kg/ha	99.6	291.8

2.6.4 STANDARD SOIL CLASSIFICATION

Standard soil classification regarding agriculture, in view of its test parameters, is detailed below in **Table – 2.16**. The use of soil for agriculture or for other use may be decided on basis of soil characteristics.

TABLE – 2.16: STANDARD SOIL CLASSIFICATION

Sr. No.	Test Parameters	Classification	
1.	pH	< 4.50 extremely acidic 4.51-5.00 very strongly acidic 5.01-5.50 strongly acidic 5.51-6.00 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 neutral	7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline > 9.0 very strongly alkaline (* tolerable to crops)
2.	Salinity or Electrical Conductivity (mmhos/cm) (1mmhos/cm = 640 ppm)	upto 1.00 average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops > 3.00 sensitive to salts	
3.	Organic Carbon (%)	upto 0.30 very less 0.31-0.40 less 0.41-0.50 medium 0.51-0.80 on an average sufficient	0.81-1.00 sufficient > 1.0 more than sufficient
4.	Nitrogen (kg/ha)	upto 50 very less 51-100 less 101-150 good	151-300 better > 300 sufficient
5.	Phosphorous (kg/ha)	upto 15 very less 16-30 less 31-50 medium	51-65 on an average sufficient 65-80 sufficient > 80 more than sufficient
6.	Potassium (kg/ha)	0 very less 120-180 less 181-240 medium	241-300 average 301-360 better > 360 more than sufficient

2.6.5 RESULTS AND DISCUSSION

The observations of soil characteristics of both time samples have discussed parameter wise as under;

- (a) The **bulk density** of soil samples are 1.32 & 1.25 and 1.31 & 1.23 g/cm³ respectively.
- (b) Soil samples have 7.06 & 6.84 and 7.01 & 6.78 **pH value** respectively. The pH value is indicating neutral to slightly alkaline in nature.
- (c) Soil samples have **conductivity** 0.154 & 0.183 and 0.151 & 0.189 mmhos/cm respectively.
- (d) Soil samples have **Organic Carbon** 0.45 & 0.71 and 0.44 & 0.73% respectively. This represents medium fertility of soils.
- (e) Soil samples have sufficient concentration of **Available Nitrogen** as its values is 89.6 & 321.2 and 92.5 & 346.7 kg/ha respectively.
- (f) Soil samples have also sufficient concentration of **Available Phosphorous** as its value is 68.8 & 119.3 and 67.4 & 112.5 kg/ha respectively.
- (g) Soil samples have less concentration of **Available Potassium** as its value is 97.3 & 274.6 and 99.6 & 291.8 kg/ha respectively.

Characteristic of Agriculture land is representing good nutrients concentration and over-all soil quality is suitable for cultivation of climatic crops and has average fertility.

2.7 TREATED WASTEWATER QUALITY

2.7.1 GENERAL

There is no wastewater discharge outside the plant premises. All the wastewater quantity generated from plant operations is being treated effectively and reused for plantation or dust suppression within plant premises. Hence, the 'zero discharge' condition has been maintained.

2.7.2 LOCATION OF WASTEWATER QUALITY SAMPLING

The treated wastewater samples have been regularly collected & analyzed from Sewage Treatment plant and WHR recycled water with grab samples in every month for required parameters.

2.7.3 OBSERVATIONS

The monthly characteristics of Sewage Treatment plant and WHR recycled water samples for the period from October-2017 to March-2018, are presented below in **Table – 2.17** & **Table – 2.18** respectively.

TABLE – 2.17: STP WATER QUALITY REPORT

Sr. No.	Parameter	Unit	Standards as EPA-1986 (Schedule-VI)	Values					
				Oct.17	Nov.17	Dec.17	Jan.18	Feb.18	Mar.18
1.	pH	-	5.5-9.0	7.4	7.3	7.5	6.96	7.12	7.07
2.	BOD	mg/l	30	8.1	6.5	7.3	6.7	7.1	6.5
3.	COD	mg/l	250	23	21	18	24	28	24
4.	TSS	mg/l	100	16	12	14	14	17	12
5.	N-Total	mg/l	100	6.9	7.5	8.1	7.2	7.8	7.4
6.	NH4- N	mg/l	50	2.5	2.8	2.1	2.3	2.6	2.5

TABLE – 2.18: WHR RECYCLED WATER QUALITY REPORT

Sr. No.	Parameter	Unit	Standards as EPA-1986 (Schedule-VI)	Values					
				Oct.17	Nov.17	Dec.17	Jan.18	Feb.18	Mar.18
1.	pH	-	5.5-9.0	7.8	7.6	7.9	7.73	7.67	7.81
2.	BOD	mg/l	30	9.5	9.7	8.9	9.8	10.2	8.6
3.	COD	mg/l	250	26	30	22	30	30	26
4.	TSS	mg/l	100	18	20	16	16	18	16
5.	N-Total	mg/l	100	9.2	9.4	8.6	8.7	9.1	8.3
6.	NH4- N	mg/l	50	4.4	4.1	3.8	4.6	4.3	4.1

2.7.4 OBSERVATIONS

Treated Wastewater quality report represents that all the checked parameters are well within the limits prescribed for wastewater in Schedule-IV of the EPA standards.

---X--X--X---

ENVIRONMENTAL STATUS REPORT

(Half-yearly Report for October-2017 to March-2018)

for

LIME STONE MINES (LEASE AREA)

of

M/s JK LAKSHMI CEMENT LIMITED

at

**Village-Semaria, Ghikuria & Nandini-Kundini
Dist-Durg (C.G.)**



Prepared By



MAHARASHTRA ENVIRO POWER LIMITED

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Lab.: 'MoEF recognized & NABL Accredited Environmental Laboratory'
CHW-01, Mouza-Mandwa, MIDC Industrial Area
Butibori, Dist. Nagpur

MARCH - 2018



'MoEF' RECOGNIZED ENVIRONMENTAL LABORATORY
VALIDITY UPTO 08.02.2022

जहाँ है हरियाली।
वहाँ है खुशहाली।।



FOREWORD

To maintain the environmental quality standards, protection of environment is a very essential task for any Industrial or mining activity. Compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding of the mining areas; therefore environment protection is becoming a prerequisite for sustainable development. To fill the requirement, the management of **M/S JK Lakshmi Cement Ltd.** has adopted a corporate responsibility of environment protection.

To comply with the Environment protection act, to fulfill statutory requirements and to be in tuned with Environmental Preservation and sustainable development, **M/S JK Lakshmi Cement Ltd.** has appointed MAHARASHTRA ENVIRO POWER LIMITED, NAGPUR as Environment Consultant for various Environmental issues related to their mining areas.


The mining activities have started and are regular. This report presents the '**Environmental Status**' for the period **October-2017 to March-2018** (half-yearly report) as compliance to the statutory requirements.

The co-operation of Staff and Management of **M/S JK Lakshmi Cement Ltd.** during the work execution period is gratefully acknowledged.

For **MAHARASHTRA ENVIRO POWER LIMITED,**

Place : NAGPUR
Date : 07.04.2018




Dr. D. G. BATTALWAR
Authorized Signatory



Site Off. : CHW01, Mandwa, Butibori Ind. Estate, Butibori, Nagpur.

Landline M. : 8805947186, 9923037416

MAHARASHTRA
ENVIRO POWER LIMITED

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1.0 INTRODUCTION

This Summarized Environmental Baseline Data report represents the environmental status regarding Micro-meteorological Data, Ambient Air Quality, Noise Level (Day & Night), Water (Surface & Ground) Quality and Soil Quality in & around the **Lime Stone Mines** of **M/s JK Lakshmi Cement Limited** at village- Semaria, Ghikuria & Nandini-Kundini, Dist. Durg (C.G.).

This report has been prepared on basis of data collected during environmental monitoring & sample collection in & around the mine lease area for the period **October-2017 to March-2018**.

2.0 SUMMARIZED ENVIRONMENTAL BASELINE DATA FOR PERIOD OCTOBER-2017 TO MARCH-2018

Regular environmental monitoring in & around the mine lease area is carried out. 'Summarized Environmental Baseline Data' for the period October-2017 to March-2018 is presented below.

2.1 MICRO-METEOROLOGICAL DATA

2.1.1 OBSERVATION

Micro-meteorological data regarding wind speed, wind direction, temperature, relative humidity, solar radiation, atmospheric pressure and rainfall collected from IMD station at Plant site of M/s JK Lakshmi Cement Limited on hourly/daily basis. Data is summarized for individual parameters for respective month and tabulated below in **Table– 2.1**. Respective graphical presentations are also stated for tabulated values.

TABLE – 2.1:
Micro-Meteorological Data for Period October-2017 to March-2018

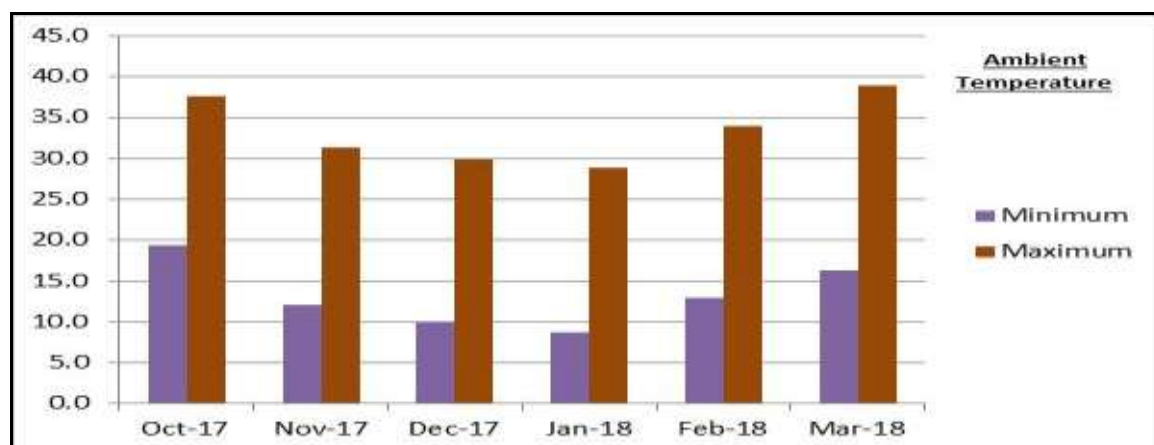
Sr. No.	Months	Minimum	Maximum
WIND SPEED (km/hr)			
1.	October - 2017	0.0	3.0
2.	November - 2017	0.0	3.2
3.	December - 2017	0.0	3.1
4.	January - 2018	0.0	2.9
5.	February - 2018	0.0	7.7
6.	March - 2018	0.0	3.1
AMBIENT TEMPERATURE (°C)			
1.	October - 2017	19.4	37.6
2.	November - 2017	12.1	31.4
3.	December - 2017	10.1	29.9
4.	January - 2018	8.8	28.9
5.	February - 2018	12.9	34.0
6.	March - 2018	16.3	38.9

table contd...

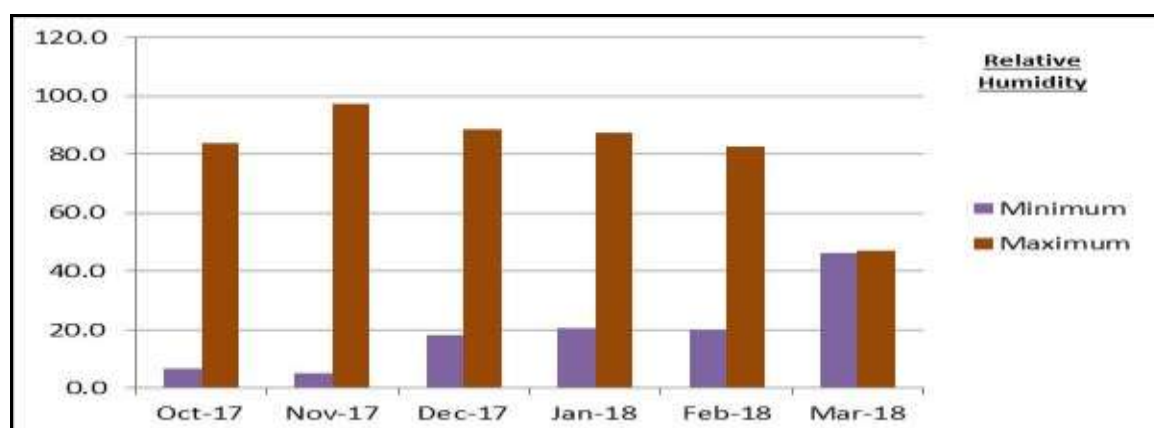
table contd...

RELATIVE HUMIDITY (%)			
1.	October - 2017	6.8	83.9
2.	November - 2017	5.1	97.4
3.	December - 2017	18.4	88.5
4.	January - 2018	20.5	87.4
5.	February - 2018	19.9	82.7
6.	March - 2018	46.1	47.0
ATMOSPHERIC PRESSURE (mm-Hg)			
1.	October - 2017	650.4	729.7
2.	November - 2017	706.8	852.0
3.	December - 2017	823.1	836.9
4.	January - 2018	823.3	833.6
5.	February - 2018	822.8	909.6
6.	March - 2018	908.6	909.8

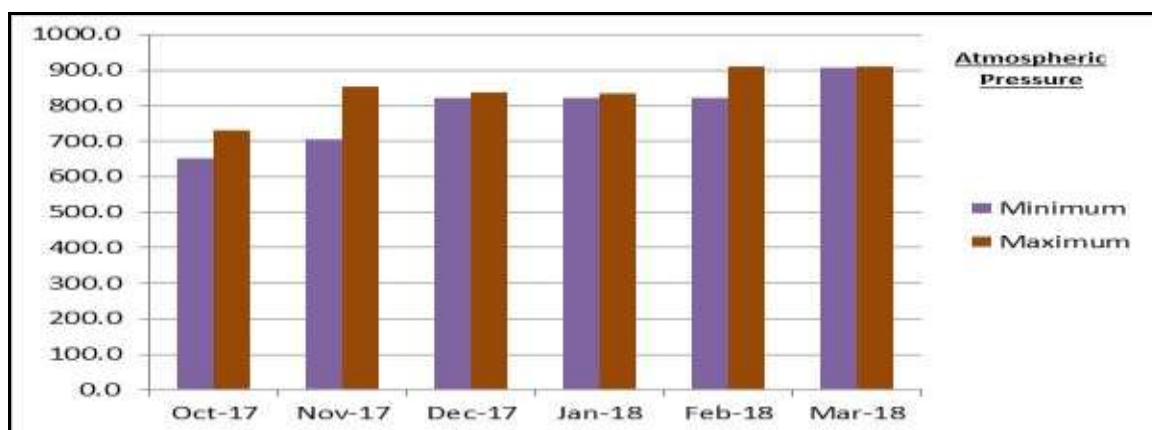
Graphical Presentation of Ambient Temperature



Graphical Presentation of Relative Humidity



Graphical Presentation of Atmospheric Pressure



2.1.2 RESULTS AND DISCUSSION

Total **rainfall** for the period October-2017 to March-2018 was 60.6 mm and out of which, 48.9 mm rainfall was found in month October-2017.

Mostly **wind** was found calm (<1.0 km/hr) and maximum time wind was predominated from W-SW direction during period October-2017 to March-2018. Maximum wind speed was observed in month of February-2018 and speed was 7.7 km/hr.

Ambient **temperature** was monitored on hourly basis for minimum & maximum during period October-2017 to March-2018. Observed minimum temperature was 8.8 °C in month January-2018 and maximum temperature was 38.9 °C in month March-2018.

Relative **humidity** was monitored on hourly basis for minimum & maximum during period October-2017 to March-2018. Observed minimum humidity was 5.1% in months November-2017 and maximum humidity was 97.4% also in month November-2017.

Atmospheric pressure was monitored on daily basis during period October-2017 to March-2018. Observed minimum atmospheric pressure was 650.4 mm-Hg in month October-2017 and maximum atmospheric pressure was 909.8 mm-Hg in months March-2018.

2.2 AMBIENT AIR QUALITY (AAQ)

Monitored Ambient Air Quality values (parameter-wise) in & around the mine lease area for the period October-2017 to March-2018 are given below in **Table- 2.2** to **Table- 2.6**.

TABLE – 2.2: PM₁₀ Particulate Matter (<10 µm)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	45.4	49.1	47.5	49.9	52.3	56.6	45.4	56.6	50.1	56.2
AAQ-2	Lease Boundary towards North Direction	49.3	52.8	51.2	54.2	56.1	60.7	49.3	60.7	54.1	60.2
AAQ-3	Lease Boundary towards East Direction	47.9	51.3	49.8	52.7	54.8	59.2	47.9	59.2	52.6	58.8
AAQ-4	Lease Boundary towards South Direction	51.5	54.7	52.4	56.4	57.6	62.8	51.5	62.8	55.9	62.3
AAQ-5	Lease Boundary towards South-East	46.8	49.2	48.3	51.5	53.1	56.4	46.8	56.4	50.9	56.1

TABLE – 2.3: PM_{2.5} Particulate Matter (<2.5 µm)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	23.1	25.6	25.2	25.3	27.8	29.4	23.1	29.4	26.1	29.2
AAQ-2	Lease Boundary towards North Direction	25.8	28.3	27.4	28.6	30.1	32.5	25.8	32.5	28.8	32.3
AAQ-3	Lease Boundary towards East Direction	25.5	27.2	26.1	27.4	28.7	31.3	25.5	31.3	27.7	31.0
AAQ-4	Lease Boundary towards South Direction	27.7	29.6	28.3	30.9	31.5	34.1	27.7	34.1	30.4	33.8
AAQ-5	Lease Boundary towards South-East	24.6	26.5	25.7	27.7	29.3	31.8	24.6	31.8	27.6	31.6

TABLE – 2.4: Sulphur Dioxide (SO₂)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	14.5	15.8	14.1	16.5	15.7	13.4	13.4	16.5	15.0	16.4
AAQ-2	Lease Boundary towards North Direction	13.9	15.2	12.8	15.8	14.2	12.9	12.8	15.8	14.1	15.7
AAQ-3	Lease Boundary towards East Direction	12.7	14.3	12.2	14.3	13.5	12.6	12.2	14.3	13.3	14.3
AAQ-4	Lease Boundary towards South Direction	13.1	15.8	14.4	14.9	13.3	12.8	12.8	15.8	14.1	15.7
AAQ-5	Lease Boundary towards South-East	13.8	16.4	15.1	16.7	15.4	14.9	13.8	16.7	15.4	16.7

TABLE – 2.5: Oxides of Nitrogen (NO_x)

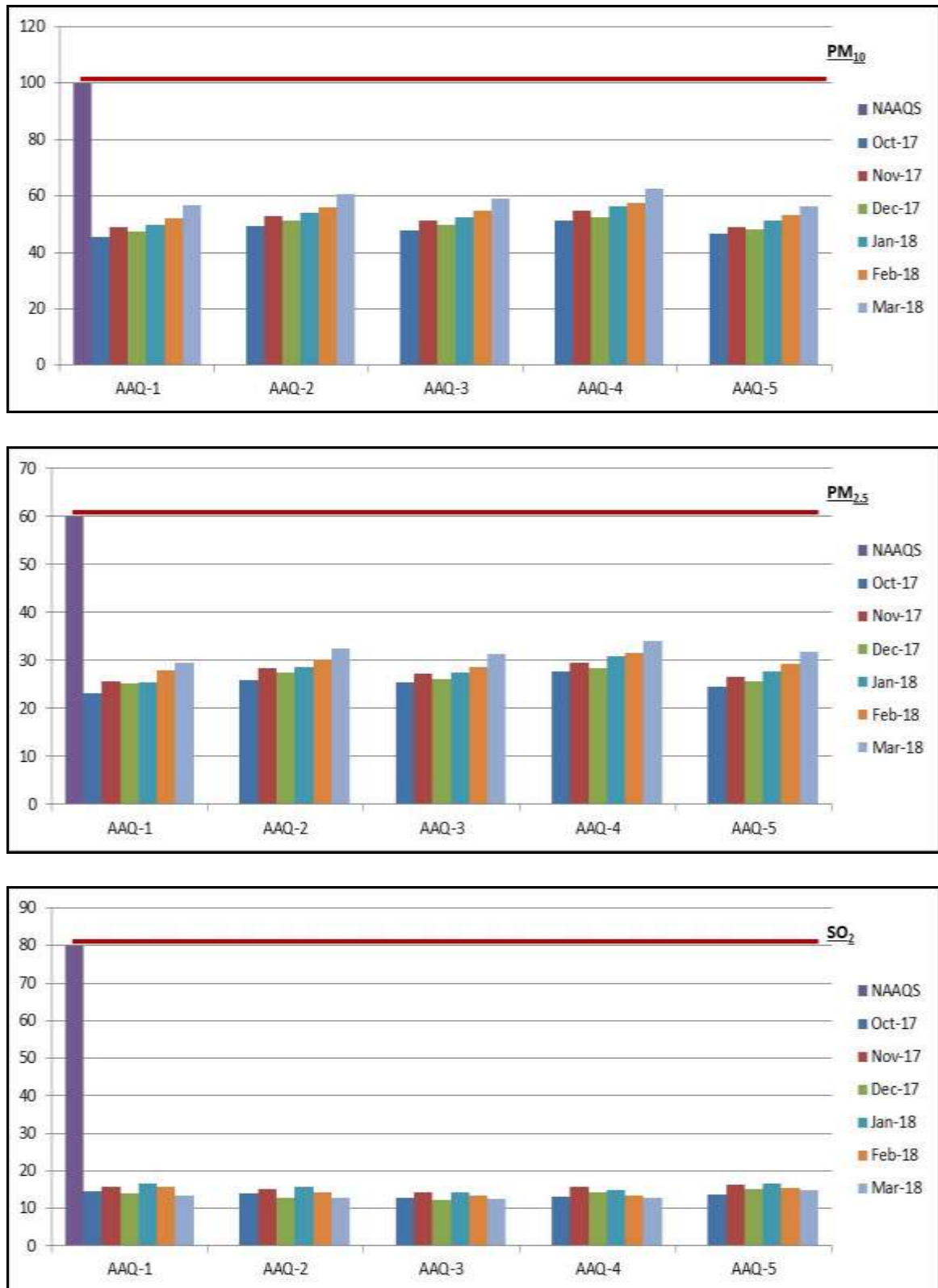
Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	16.7	18.4	17.6	19.2	17.8	16.7	16.7	19.2	17.7	19.1
AAQ-2	Lease Boundary towards North Direction	15.8	17.6	16.3	18.5	16.3	15.9	15.8	18.5	16.7	18.4
AAQ-3	Lease Boundary towards East Direction	14.9	16.2	15.5	17.1	15.7	14.4	14.4	17.1	15.6	17.0
AAQ-4	Lease Boundary towards South Direction	14.5	17.1	15.8	16.7	15.5	14.2	14.2	17.1	15.6	17.1
AAQ-5	Lease Boundary towards South-East	14.2	17.6	16.4	17.3	16.1	14.6	14.2	17.6	16.0	17.6

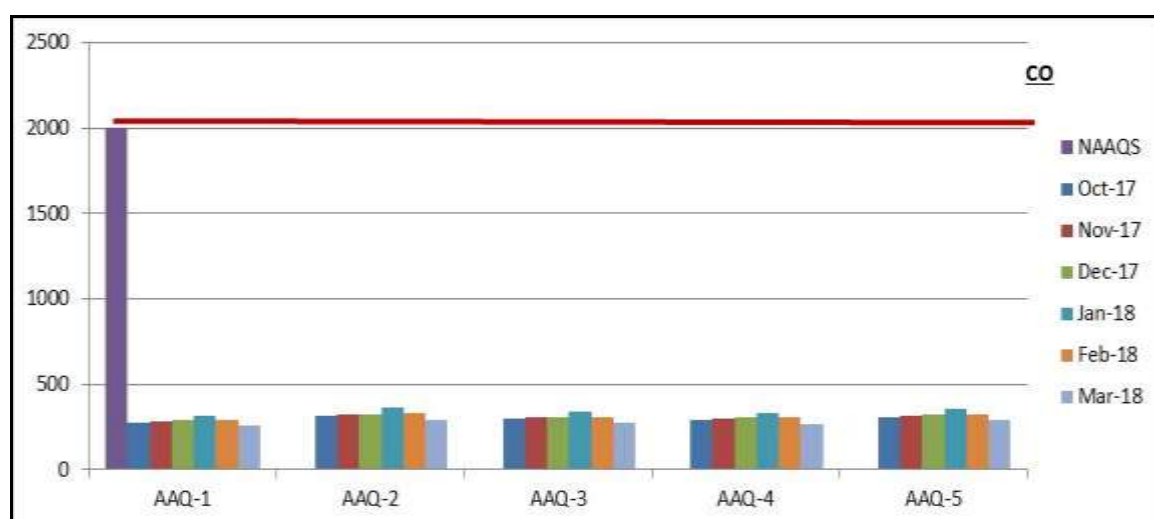
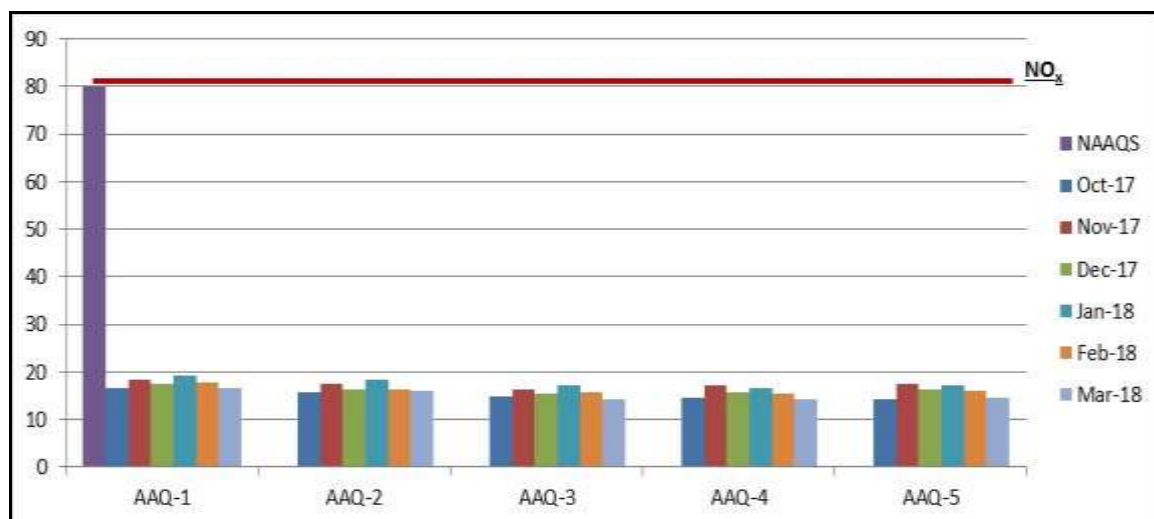
TABLE – 2.6: Carbon Monoxide (CO)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	274	282	288	315	291	257	257	315	285	313
AAQ-2	Lease Boundary towards North Direction	319	323	326	367	329	294	294	367	326	363
AAQ-3	Lease Boundary towards East Direction	297	305	308	342	311	278	278	342	307	339
AAQ-4	Lease Boundary towards South Direction	292	296	305	336	308	269	269	336	301	333
AAQ-5	Lease Boundary towards South-East	311	317	322	358	325	288	288	358	320	355

The graphical presentations (parameter-wise) of above observations are presented below in **Figure – 2.1**.

Figure – 2.1: GRAPHICAL PRESENTATION (Parameter-wise)





2.2.1 FUGITIVE DUST EMISSION MONITORING AT MINES AREA

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
ST- 1	Near Material Loading Point (Mine Pit)	280.1	310.2	324.8	355.8	374.9	364.2
ST - 2	Near Mines Crusher	224.3	252.8	316.0	335.2	368.9	354.1
ST - 3	Near Truck Loading Hopper	268.6	254.2	324.8	355.8	354.6	364.2
ST - 4	Near Mining Pit	298.2	310.4	316.0	344.8	360.6	330.4

2.2.2 RESULTS & DISCUSSION

These monitored values represent quite satisfactory condition regarding Air Quality in & around the mine lease area in comparison of the National Ambient Air Quality standards (NAAQS) and Fugitive dust emission standards.

2.3 NOISE LEVEL

Noise Levels in & around the mine lease area are monitored on regular basis in day & night hours separately. Summarized observed values of Noise Level for the period October-2017 to March-2018 are given below in **Table-2.7 & Table-2.8.**

TABLE – 2.7: NOISE LEVEL (DAY HOURS)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG
NL – 1	Near Mine Office	45.4	47.1	43.8	46.4	48.2	49.9	43.8	49.9	46.8
NL – 2	Lease Boundary towards North Direction	47.2	49.5	48.1	50.7	52.3	53.7	47.2	53.7	50.3
NL – 3	Lease Boundary towards East Direction	44.6	46.8	45.3	47.8	49.6	51.2	44.6	51.2	47.6
NL – 4	Lease Boundary towards South Direction	45.1	47.4	46.6	47.3	49.5	51.8	45.1	51.8	48.0
NL – 5	Lease Boundary towards South - East	44.9	46.3	45.7	47.6	48.8	51.3	44.9	51.3	47.4

TABLE – 2.8: NOISE LEVEL (NIGHT HOURS)

Code	Stations	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	MIN	MAX	AVG
NL – 1	Near Mine Office	41.3	42.8	39.6	40.4	41.6	44.9	39.6	44.9	41.8
NL – 2	Lease Boundary towards North Direction	42.9	45.1	43.7	44.5	45.9	47.4	42.9	47.4	44.9
NL – 3	Lease Boundary towards East Direction	40.5	42.6	41.2	42.3	43.3	44.7	40.5	44.7	42.4
NL – 4	Lease Boundary towards South Direction	41.4	43.1	42.4	43.7	44.5	45.3	41.4	45.3	43.4
NL – 5	Lease Boundary towards South - East	40.8	42.3	41.6	42.8	43.7	44.4	40.8	44.4	42.6

2.3.1 RESULTS & DISCUSSION

In comparison of the prescribed National Ambient Noise Level Standards, the observed values of Noise level are well within stipulated limits prescribed for industrial/commercial/residential area. The monitored values represent quite satisfactory condition regarding Noise pollution in & around the mine lease area.

2.4 STACK EMISSIONS

Crusher stack is operational and monitoring was carried out for emissions. Stack attached to 800 TPH Crusher has been monitored for the period October-2017 to March-2018 for required parameters. Results are presented in **Table – 2.9**.

TABLE – 2.9: STACK EMISSION ANALYSIS REPORT

Particulars	Unit	Stack #1						Consent Status
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	
Stack Attached with	-	800 TPH Crusher						-
Stack Height	Meter	32.0						-
Stack Diameter	Meter	1.5						-
Ambient Temperature	°C	33.0	32.0	29.0	29.0	32.0	36.0	-
Flue Gas Temperature	°C	48.0	46.0	47.0	47.0	48.0	48.0	-
Velocity	m/s	6.7	6.9	6.7	6.9	7.1	7.1	-
Total Volumetric Flow	Nm ³ /sec	10.5	10.8	10.5	10.8	11.2	11.2	-
Total Particulate Matter (TPM)	mg/Nm ³	25.2	26.5	25.7	26.4	26.9	27.5	< 30.0

2.4.1 RESULTS & DISCUSSION

The observations show that stack emissions are well within standards prescribed in the 'Consent for Operation'.

2.5 WATER (GROUND & SURFACE) QUALITY

2.5.1 GENERAL

A routine analysis of Water Quality is required to find out any contamination of natural water sources. The mine lease area is maintaining the ‘**Zero Discharge**’ condition and Ponds are lined. There is no chance of ground water contamination. However, as per stipulated condition, surface water and ground water quality have monitored for routine parameters.

2.5.2 LOCATION OF WATER QUALITY SAMPLING

The water quality monitoring was selected with a view to check out the impact on ground water sources in and around mine lease area. Total 04 (four) number, 03 (three) ground water sample and 01 (one) surface water sample from Shivnath river flowing near the mine lease area, were collected and analyzed.

Location of sampling stations is given in **Table – 2.10**.

Table – 2.10: Description of Ground & Surface Water Sampling Stations

Sr. No.	Sampling Stations	Station Code	Approx. Distance from Mine Lease	Direction from Mine Lease
1.	Bore well within mine lease area	GW – 1	Within	-
2.	Bore well in Hardi village	GW – 2	1.0 km	E
3.	Bore well in Pitora village	GW – 3	1.5 km	N
4.	Shivnath river	SW – 1	5.0 km	NW

2.4.3 OBSERVATIONS

The characteristics of ground water samples and surface water sample for the period October-2017 to March-2018, are presented below in **Table – 2.11 & Table – 2.12**.

TABLE – 2.11: GROUND & SURFACE WATER QUALITY REPORT

Date of Sampling			21.12.2017					
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values			
			Desirable	Permissible	GW-1	GW-2	GW-3	SW-1
A.	ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT							
1.	Colour	Hazen	5	15	CL	CL	CL	CL
2.	Odour	UO	AG	AG	AG	AG	AG	AG
3.	Taste	AG	AG	AG	AG	AG	AG	ND
4.	Turbidity	NTU	1	5	< 1.0	< 1.0	< 1.0	2.3
5.	Total Dissolved Solids	mg/l	500	2000	488.0	508.0	468.0	386.0
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.21	7.12	7.13	7.89
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.8	3.5	3.5	7.7
8.	Biochemical Oxygen Demand (BOD) 3 days 27 °C	mg/l	-	-	<3.0	<3.0	<3.0	<3.0
9.	Chemical Oxygen Demand (COD)	mg/l	-	-	8.0	8.0	8.0	12.0
10.	Conductivity	µS/cm	-	-	734.0	766.0	708.0	594.0
11.	Total Alkalinity as CaCO ₃	mg/l	200	600	178.0	192.0	174.0	164.0
12.	Total Hardness as CaCO ₃	mg/l	200	600	216.0	226.0	202.0	162.0
13.	Calcium as Ca ⁺⁺	mg/l	75	200	56.2	58.8	52.5	42.1
14.	Magnesium as Mg ⁺⁺	mg/l	30	100	18.1	19.0	17.0	13.6
15.	Chlorides as Cl	mg/l	250	1000	71.0	65.0	62.0	55.0
16.	Sulphates as SO ₄	mg/l	200	400	51.6	52.3	49.7	22.4

Table contd...

Table contd...

Sr. No.	Parameters	Unit	As per IS 10500:2012		Values			
			Desirable	Permissible	GW-1	GW-2	GW-3	SW-1
17.	Fluoride as F	mg/l	1.0	1.5	0.54	0.58	0.61	0.11
18.	Nitrates as NO ₃	mg/l	45	NR	8.1	8.9	9.3	5.1
19.	Iron as Fe	mg/l	0.3	NR	0.15	0.21	0.22	0.05
20.	Manganese as Mn	mg/l	0.1	0.3	< 0.01	< 0.01	< 0.01	< 0.01
21.	Zinc as Zn	mg/l	5.0	15.0	BDL	BDL	BDL	BDL
22.	Copper as Cu	mg/l	0.05	1.5	< 0.01	< 0.01	< 0.01	< 0.01
23.	Aluminium as Al	mg/l	0.03	0.2	< 0.01	< 0.01	< 0.01	< 0.01
24.	Boron as B	mg/l	0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01
25.	Total Coliform	MPN/100 ml	Absent	NR	0	0	0	70
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	11
B.	TOXIC SUBSTANCES							
27.	Cadmium & its Compounds as Cd	mg/l	0.003	NR	< 0.001	< 0.001	< 0.001	< 0.001
28.	Arsenic & its Compounds as As	mg/l	0.01	0.05	< 0.005	< 0.005	< 0.005	< 0.005
29.	Lead & its Compounds as Pb	mg/l	0.05	NR	< 0.005	< 0.005	< 0.005	< 0.005
30.	Chromium & its Compounds as Cr	mg/l	0.01	NR	< 0.001	< 0.001	< 0.001	< 0.001
31.	Selenium & its Compounds as Se	mg/l	0.01	NR	< 0.005	< 0.005	< 0.005	< 0.005
32.	Mercury as Hg	mg/l	0.001	NR	< 0.0005	< 0.0005	< 0.0005	< 0.0005

Note: CL – Colorless; UO – unobjectionable; AG – agreeable; NR – no relaxation; BDL – below detectable limit; MPN – most probable number

TABLE – 2.12: GROUND & SURFACE WATER QUALITY REPORT

Date of Sampling			21.03.2018					
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values			
			Desirable	Permissible	GW-1	GW-2	GW-3	SW-1
A.	ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT							
1.	Colour	Hazen	5	15	CL	CL	CL	CL
2.	Odour	UO	AG	AG	AG	AG	AG	AG
3.	Taste	AG	AG	AG	AG	AG	AG	ND
4.	Turbidity	NTU	1	5	< 1.0	< 1.0	< 1.0	1.7
5.	Total Dissolved Solids	mg/l	500	2000	508.0	532.0	486.0	431.0
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.29	7.18	7.22	8.06
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.6	3.5	3.6	7.5
8.	Biochemical Oxygen Demand (BOD) 3 days 27 °C	mg/l	-	-	<3.0	<3.0	<3.0	<3.0
9.	Chemical Oxygen Demand (COD)	mg/l	-	-	8.0	8.0	8.0	12.0
10.	Conductivity	µS/cm	-	-	756.0	808.0	738.0	663.0
11.	Total Alkalinity as CaCO ₃	mg/l	200	600	186.0	204.0	182.0	188.0
12.	Total Hardness as CaCO ₃	mg/l	200	600	222.0	234.0	208.0	168.0
13.	Calcium as Ca ⁺⁺	mg/l	75	200	57.7	60.8	54.1	43.7
14.	Magnesium as Mg ⁺⁺	mg/l	30	100	18.6	19.7	17.5	14.1
15.	Chlorides as Cl	mg/l	250	1000	73.0	69.0	67.0	59.0
16.	Sulphates as SO ₄	mg/l	200	400	53.4	54.1	52.5	27.1

Table contd...

Table contd...

Sr. No.	Parameters	Unit	As per IS 10500:2012		Values			
			Desirable	Permissible	GW-1	GW-2	GW-3	SW-1
17.	Fluoride as F	mg/l	1.0	1.5	0.56	0.62	0.64	0.14
18.	Nitrates as NO ₃	mg/l	45	NR	9.6	10.2	11.1	7.6
19.	Iron as Fe	mg/l	0.3	NR	0.16	0.24	0.23	0.08
20.	Manganese as Mn	mg/l	0.1	0.3	< 0.01	< 0.01	< 0.01	< 0.01
21.	Zinc as Zn	mg/l	5.0	15.0	BDL	BDL	BDL	BDL
22.	Copper as Cu	mg/l	0.05	1.5	< 0.01	< 0.01	< 0.01	< 0.01
23.	Aluminium as Al	mg/l	0.03	0.2	< 0.01	< 0.01	< 0.01	< 0.01
24.	Boron as B	mg/l	0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01
25.	Total Coliform	MPN/100 ml	Absent	NR	0	0	0	73
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	23
B.	TOXIC SUBSTANCES							
27.	Cadmium & its Compounds as Cd	mg/l	0.003	NR	< 0.005	< 0.005	< 0.005	< 0.005
28.	Arsenic & its Compounds as As	mg/l	0.01	0.05	< 0.005	< 0.005	< 0.005	< 0.005
29.	Lead & its Compounds as Pb	mg/l	0.05	NR	< 0.001	< 0.001	< 0.001	< 0.001
30.	Chromium & its Compounds as Cr	mg/l	0.01	NR	< 0.01	< 0.01	< 0.01	< 0.01
31.	Selenium & its Compounds as Se	mg/l	0.01	NR	< 0.005	< 0.005	< 0.005	< 0.005
32.	Mercury as Hg	mg/l	0.001	NR	< 0.001	< 0.001	< 0.001	< 0.001

Note: CL – Colorless; UO – unobjectionable; AG – agreeable; NR – no relaxation; BDL – below detectable limit; MPN – most probable number

2.5.4 RESULTS AND DISCUSSION

The results of ground & surface water quality are discussed as per findings and its significance over environment and human being.

Overall quality of water samples are showing the water sources of the area are not polluted except the surface water samples getting contamination from surface run-off or domestic uses. The coliforms values are exception otherwise all the water samples are indicating its characteristics within limit as given in relevant Indian Standards.

Zero discharge condition of waste water from mine lease area makes the entire area free from water pollution. Overall quality of water samples also presents that the water sources of the area are not polluted.

2.6 SOIL QUALITY

2.6.1 GENERAL

Soil samples were collected at near by location of mine lease area, so that any adverse impact may be identified.

2.6.2 LOCATION OF SOIL MONITORING

Total three soil samples were collected from lease area and village side. Sampling locations have described in **Table – 2.13**.

TABLE –2.13: DETAILS OF SAMPLING STATIONS OF SOIL ANALYSIS

Sr. No.	Sampling Stations	Station Code	Approx. Distance from Mine Lease	Direction from Mine Lease
1.	Mine Lease Area; (Barren Land)	S - 1	Within	-
2.	Pitora village; (Barren Land)	S - 2	1.5 km	SE
3.	Hardi village; (Agriculture Land)	S - 3	1.0 km	N

2.6.3 OBSERVATIONS

The physico-chemical characteristics of soil sample for the period October-2017 to March-2018 have reported in **Table– 2.14 & Table– 2.15**.

TABLE – 2.14: SOIL QUALITY REPORT

Date of Sampling		21.12.2017			
Sr. No.	Parameters	Unit	S-1	S-2	S-3
A.	Physical Properties				
1.	Bulk Density	g/cc	1.33	1.32	1.24
2.	Particle Size Distribution	% Gravel	9.8	9.1	4.2
		% Sand	36.6	36.3	34.7
		% Silt	30.2	30.5	33.3
		% Clay	23.4	24.1	27.8

Table contd...

Table contd...

Sr. No.	Parameters	Unit	S-1	S-2	S-3
3.	Soil Texture	-	Clay Loam	Clay Loam	Clay Loam
4.	Porosity	%	39.2	39.6	44.1
5.	Water Holding Capacity	%	32.5	32.9	36.7
B.	Chemical Properties				
1.	pH at 25 °C	-	7.14	7.19	6.89
2.	Electrical Conductivity	mmhos/cm	0.156	0.154	0.182
3.	Organic Carbon	%	0.42	0.48	0.84
4.	Cation Exchange Capacity	meq/100 gm	27.2	28.6	35.1
5.	Exchangeable Calcium as Ca ⁺⁺	mg/kg	46.9	47.7	56.9
6.	Exchangeable Magnesium as Mg ⁺⁺	mg/kg	11.4	12.9	19.5
7.	Chlorides as Cl	mg/kg	87.3	88.1	81.2
8.	Sulphate as SO ₄	mg/kg	92.6	91.4	107.7
9.	Nitrogen as N	kg/ha	71.1	72.7	312.8
10.	Phosphorous as P ₂ O ₅	kg/ha	64.3	67.6	96.2
11.	Potassium as K ₂ O	kg/ha	75.8	74.3	251.5

TABLE – 2.15: SOIL QUALITY REPORT

Date of Sampling	21.03.2018
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Sr. No.	Parameters	Unit	S-1	S-2	S-3
A.	Physical Properties				
1.	Bulk Density	g/cc	1.34	1.33	1.22
2.	Particle Size Distribution	% Gravel	9.4	9.7	3.6
		% Sand	36.9	36.4	34.1
		% Silt	30.1	30.8	33.9
		% Clay	23.6	23.1	28.4

Table contd...

Table contd...

Sr. No.	Parameters	Unit	S-1	S-2	S-3
3.	Soil Texture	-	Clay Loam	Clay Loam	Clay Loam
4.	Porosity	%	40.7	40.3	42.9
5.	Water Holding Capacity	%	33.2	32.5	35.4
B.	Chemical Properties				
1.	pH at 25 °C	-	7.17	7.21	6.84
2.	Electrical Conductivity	mmhos/cm	0.152	0.157	0.188
3.	Organic Carbon	%	0.43	0.46	0.81
4.	Cation Exchange Capacity	meq/100 gm	26.8	28.3	34.9
5.	Exchangeable Calcium as Ca ⁺⁺	mg/kg	46.4	47.1	57.3
6.	Exchangeable Magnesium as Mg ⁺⁺	mg/kg	11.2	12.5	19.8
7.	Chlorides as Cl	mg/kg	91.1	89.8	84.6
8.	Sulphate as SO ₄	mg/kg	93.8	96.2	109.5
9.	Nitrogen as N	kg/ha	73.6	75.1	329.3
10.	Phosphorous as P ₂ O ₅	kg/ha	67.5	69.3	102.6
11.	Potassium as K ₂ O	kg/ha	74.7	72.9	278.2

2.6.4 STANDARD SOIL CLASSIFICATION

Standard soil classification regarding agriculture, in view of its test parameters, is detailed below in **Table – 2.16**. The use of soil for agriculture or for other use may be decided on basis of soil characteristics.

TABLE – 2.16: STANDARD SOIL CLASSIFICATION

Sr. No.	Test Parameters	Classification	
1.	pH	< 4.50 extremely acidic 4.51-5.00 very strongly acidic 5.01-5.50 strongly acidic 5.51-6.00 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 neutral	7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline > 9.0 very strongly alkaline (* tolerable to crops)
2.	Salinity or Electrical Conductivity (mmhos/cm) (1mmhos/cm = 640 ppm)	upto 1.00 average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops > 3.00 sensitive to salts	
3.	Organic Carbon (%)	upto 0.30 very less 0.31-0.40 less 0.41-0.50 medium 0.51-0.80 on an average sufficient	0.81-1.00 sufficient > 1.0 more than sufficient
4.	Nitrogen (kg/ha)	upto 50 very less 51-100 less 101-150 good	151-300 better > 300 sufficient
5.	Phosphorous (kg/ha)	upto 15 very less 16-30 less 31-50 medium	51-65 on an average sufficient 65-80 sufficient > 80 more than sufficient
6.	Potassium (kg/ha)	0 very less 120-180 less 181-240 medium	241-300 average 301-360 better > 360 more than sufficient

2.6.5 RESULTS AND DISCUSSION

The observations of soil characteristics of both time samples have discussed parameter wise as under;

- (a) The **bulk density** of all soil samples are 1.33, 1.32 & 1.24 and 1.34, 1.33 & 1.22 g/cm³ respectively.
- (b) All soil samples have 7.14, 7.19 & 6.89 and 7.17, 7.21 & 6.84 **pH value** respectively. The pH value is indicating neutral to slightly alkaline in nature.
- (c) All soil samples have **conductivity** 0.156, 0.154 & 0.182 and 0.152, 0.157 & 0.188 mmhos/cm respectively.
- (d) All soil samples have **Organic Carbon** 0.42, 0.48 & 0.84 and 0.43, 0.46 & 0.81% respectively. This represents medium fertility of soils.
- (e) All soil samples have sufficient concentration of **Available Nitrogen** as its values are 71.1, 72.7 & 312.8 and 73.6, 75.1 & 329.3 kg/ha respectively.
- (f) All soil samples have also sufficient concentration of **Available Phosphorous** as its values are 64.3, 67.6 & 96.2 and 67.5, 69.3 & 102.6 kg/ha respectively.
- (g) All soil samples have less concentration of **Available Potassium** as its values are 75.8, 74.3 & 251.5 and 74.7, 72.9 & 278.2 kg/ha respectively.

Characteristic of barren & agriculture land is representing good nutrients concentration and over-all soil quality is suitable for cultivation of climatic crops and has average fertility.

---X--X--X---