



JKLC/DU/ENV/MoEF/07

30.04.2019

**Addl Principal Chief Conservator of Forest**

Ministry of Environment and Forest, Climate Change  
Regional Office (WCZ), Ground Floor  
East Wing, New Secretariat Building,  
Civil Line, Nagpur-440001

**Sub: Submission of Half yearly compliance report of M/s JK Lakshmi Cement Limited (Durg)**

(Ref: MoEFCC clearance letter no. J-11011/1170/2007-IA II(I)M Dated 13<sup>th</sup> May 2009 and validity extension of EC on 04.09.2015 & EC Amendment on 27 Feb 2010, 23 July 2015, 07 June 2017, 20 July 2018, and 14 November 2018)

Dear Sir,

As per the Environment Clearance given by MoEFCC vide its letter no. J-11011/1170/2007-IA II (I) M Dated 13.05.2009, we are hereby enclosing half yearly compliance report for our Integrated Cement Plant (Clinker 1.5 MTPA, Cement 5 MTPA), Lime Stone Mines (Limestone production capacity 4.8 MTPA from 267.695 ha & 251.105 ha) and Captive Thermal Power Plant (40 MW) and Waste Heat Recovery Based Power Plant – 08 MW located at village Malpuri Khurd, Khasadih, Semaria, Ghikuria and Nandini Kundini, Tehsil Dhamda, District Durg, C.G., for the period of **Oct 18 - March 2019**.

It may be noted that we are forwarding half yearly compliance report with annexures by mail on the mail address: [moefregionalofficenagpur@gmail.com](mailto:moefregionalofficenagpur@gmail.com) for your ready reference.

Thanking you  
Yours Faithfully

For JK LAKSHMI CEMENT LTD.

D.K. Mehta  
Sr. Vice President (Works)

Encl.: As above

- CC: 1. Regional Officer – Chhattisgarh Environment Conservation Board, 5/32 Bungalow Bhilai, Dist. - Durg. (CG)  
2. Zonal Officer – Central Pollution Control Board 3<sup>rd</sup> Floor, Sahakar Bhawan North TT Nagar Bhopal- 462003



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PLASTER OF PARIS

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**HALF YEARLY COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE FOR  
INTEGRATED CEMENT PLANT AND LIMESTONE MINE**

(For the period of October 2018 to March 2019)

Reference: F. No. J – 11011/1170/2007 – IA II (I) dated 13<sup>th</sup> May, 2009 and Validity extension of EC issued on 04<sup>th</sup> September, 2015 with effect from 12.05.2014 and subsequent amendments i.e. -

- i.) EC Amendment regarding change of Plant location on 27th February 2010;
- ii.) EC Amendment regarding change of mode of limestone transport from mines to Cement Plant on 23rd July 2015;
- iii.) EC Amendment regarding opening of second pit in the mining lease area on 07th June 2017;
- iv.) EC Amendment regarding reduction of mining lease area from 281.339 ha to 251.105 ha and interception of Ground Water Table during mining operation on 20th July 2018;
- v.) EC amendment regarding change in configuration of clinker production of 1.5 MTPA to 1.98 MTPA on 14<sup>th</sup> November , 2018

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 <sup>3</sup> by installing adequate air pollution control system.	<ul style="list-style-type: none"> <li>• Continuous Emission monitoring System (CEMS) for monitoring of SO<sub>x</sub>, NO<sub>x</sub> and CO parameters are already in place at RABH stack and Opacity meters have been installed at all major stacks for monitoring SPM. Continuous monitoring systems have been installed at all Stacks and are connected to CECB, Raipur and CPCB, New Delhi.</li> <li>• The emission of SPM is maintained well within the prescribed limit, as we have installed state of art Air Pollution Controlling Equipments at all stages with adequate capacities.</li> </ul>
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 <sup>3</sup> . AFBC boilers shall be installed to control SO <sub>2</sub> and NO <sub>x</sub> emissions. At no time, particulate emissions from the cement plant shall exceed 50 mg/Nm <sup>3</sup> . 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	<ul style="list-style-type: none"> <li>• High efficiency Electrostatic precipitator is installed at Clinker Cooler. Reverse Air Bag House is installed at Raw Mill/Kiln system.</li> <li>• The mills including Coal mill, Slag Mill, Cement Mill-1 and -2 are fully equipped with the efficient bag houses.</li> <li>• 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.</li> <li>• Interlocked systems have been already provided at all major Air pollution controlling equipments for auto shut down in case of failure of any pollution control equipments.</li> </ul>

	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"> <li>• <b>Continuous Stack emission monitoring data are being uploaded on the CPCB &amp; CECB server.</b></li> <li>• <b>Half yearly compliance report are being submitted to MOEFCC regional office Nagpur and Quarterly Report submitted to CPCB and CECB.</b></li> </ul>
3.	Ambient air quality monitoring stations shall be set up in the down wind direction as well where maximum ground level concentration of SPM, SO2 and NOx are anticipated as per statutory 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.	<ul style="list-style-type: none"> <li>• <b>Being Complied.</b></li> <li>• <b>To continuously monitor Ambient Air Quality, 06 continuous ambient air monitoring systems have been already installed including 04 at plant and 02 at mines premises.</b></li> <li>• <b>Data of ambient air quality monitoring are being displayed at both Plant and Mines main gate.</b></li> </ul>
4.	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.	<ul style="list-style-type: none"> <li>• <b>Efficient dust collection and extraction systems (Bag filters) have been installed at all loading, unloading and at all transfer points.</b></li> <li>• <b>All the conveyer belts carrying the material are fully covered.</b></li> <li>• <b>All the raw materials including lime Stone, Coal, Slag &amp; Gypsum etc. are being stored in the closed sheds.</b></li> <li>• <b>Silos are provided for storage of Clinker, Fly ash and Cement.</b></li> <li>• <b>Efficient Bag Filters are provided at Coal and Lime stone handling systems.</b></li> <li>• <b>Dust Suppression and water sprinkling, systems have already been provided at mines area.</b></li> <li>• <b>Wet drilling method is being imparted to control the dust emission during drilling.</b></li> <li>• <b>02 water tankers have been engaged for dust suppression purposes at Mine haul roads</b></li> </ul>
5.	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 NOx shall also be displayed	<ul style="list-style-type: none"> <li>• <b>Data of ambient air quality monitoring are being displayed on display boards which are installed at Plant main gate and Mines main gate area, for the information of general public.</b></li> <li>• <b>Continuous online ambient air quality monitoring and Continuous stack emission</b></li> </ul>

	prominently outside the premises at the appropriate place for the information of general public	<p>monitoring data are being uploaded to both Chhattisgarh Environment Conservation Board (CECB) and Central pollution Control Board (CPCB) server has been provided. The details are also being provided in hard copy once in six months.</p> <ul style="list-style-type: none"> <li>Links for the same are_ <ul style="list-style-type: none"> <li><a href="http://adagepcb.glensserver.com/">http://adagepcb.glensserver.com/</a></li> <li><a href="http://cecb.glensserver.com/">http://cecb.glensserver.com/</a></li> <li><a href="http://www.envsaindia.com/cpcb/login.php">www.envsaindia.com/cpcb/login.php</a></li> </ul> </li> </ul>
6.	Secondary fugitive emissions from all the sources shall be controlled within the permissible limits set by the Ministry and regularly monitored. Guidelines /Code of Practice issued by the CPCB shall be followed.	<ul style="list-style-type: none"> <li>All necessary measures have been taken to control the Secondary fugitive emissions. These fugitive emissions are kept within the permissible limits as set by the ministry and are regularly monitored</li> </ul>
7.	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	<ul style="list-style-type: none"> <li>The plant and mines area have concrete road for road transportation and 02 water tankers have been engaged for dust suppression purposes at Mine haul roads.</li> </ul>
8.	No new pit shall be opened till old pit is exhausted	<p>To open new pit, EC amendment have been obtained from the MOEF &amp; CC vide letter no J-11011/1770/2007-IA II (I) Dated 07.06.2017</p>
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"> <li>Noted &amp; Being complied, the construction of pipe conveyer belt is not completed due to land acquisition of approx 300 m 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.</li> <li>However all raw materials are being transported through tarpaulin covered trucks (containers) whose weightment is done.</li> <li>Only valid pollution under control vehicles are allowed inside the plant.</li> <li>Detail showing the progress of the pipe conveyor is attached as Annexure- I</li> </ul>
10.	Total water requirement from Shivnath River and bore wells shall not exceed 4500 m <sup>3</sup> /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	<ul style="list-style-type: none"> <li>Will be complied</li> <li>Root zone technology based Sewage Treatment plant with installed capacity 70 m<sup>3</sup>/day is under operation and the treated water is being utilized for the Dust suppression and green belt development.</li> </ul>

	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"> <li>• The Power Plant installation and commissioning happened in the first week of May 2019. Air Cooled condensers have been provided to CPP to reduce water consumption. We are maintaining "Zero discharge" which is being and will be strictly followed.</li> </ul>
11.	Permission for the drawl of 4500 m <sup>3</sup> /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"> <li>• Permission for drawl of water from Shivnath river and ground water from</li> <li>• 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.</li> <li>• Permission from CGWA has been already been obtained vide CGWA letter no 21-4(34)/NCCR/CGWA/2012-2036 Dated 26<sup>th</sup> Sept 2016.</li> </ul>
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"> <li>• Detailed hydrological study has been carried out and status of compliances / recommendations is being regularly submitted to the CGWA.</li> </ul>
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"> <li>• All the bag filter dust, raw meal dust, coal dust, clinker dust and cement dust from Pollution control devices are being recycled and reused in the process for cement manufacturing. Our STP is based on Root zone Technology and sludge acts as manure to plants and waste oil is being sold to authorized recyclers/re-processors.</li> </ul>
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"> <li>• Noted and Necessary provision has been already made.</li> </ul>
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"> <li>• Being complied.</li> </ul>
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"> <li>• Already complied vide letter No. JKLC/Durg/Env/1109 dated 12.12.2011.</li> </ul>
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"> <li>• The Captive power plant installation and commissioning happened in the first week of May 2019. All the fly ash to be generated would be used within the plant for cement production.</li> </ul>

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"> <li>• The company has employed about 60 workers who are engaged in plantation work in and around the plant boundary as well in the mines area.</li> <li>• Two water tankers have been engaged for watering of these plants.</li> <li>• So far the company has planted about 162434 including 92898 plants in mines area and 69536 plants in Factory area.</li> <li>• We have developed in-house nurseries where about 25000 saplings have been developed for further green belt development in the plant and mines area.</li> <li>• Under Harihar Chhattisgarh Project Total 15028 plants planted in the open area of Mines and nearby villages.</li> <li>• Photographs are attached in Annexure-II</li> </ul>
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"> <li>• Wet drilling method is being used to control the dust emission from mines.</li> </ul>
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"> <li>• Being complied</li> </ul>
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"> <li>• Already complied and copies of the same have been already submitted to MOEF &amp; CC.</li> </ul>
22.	All the safety norms stipulated by the Director General, Mines and Safety (DGMS) shall be implemented.	<ul style="list-style-type: none"> <li>• Being complied.</li> <li>• The necessary Personal Protective Equipments (PPEs) have been provided to the employees and workers.</li> </ul>
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"> <li>• R &amp; R is not applicable to us.</li> </ul>
24.	All the recommendation mentioned in the Corporate Responsibility for Environment	<ul style="list-style-type: none"> <li>• Noted and Being Followed</li> </ul>

	Protection (CREP) guidelines shall be followed implemented	
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"> <li>• The company has provided temporary housing for labor within site.</li> <li>• Sewage Treatment plant based on Root zone technology with installed capacity of 70 m<sup>3</sup>/day is provided for the treatment of sewage generated from worker's colony and the treated water is being utilized for Dust suppression and Green Belt development.</li> </ul>
<b>B.</b>	<b>GENERAL CONDITIONS:</b>	
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"> <li>• Being complied.</li> </ul>
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"> <li>• Noted and agreed.</li> </ul>
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. Asphaltting /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"> <li>• Adequate dust collection and extraction systems have been provided at various transfer points, raw mill handling unloading, conveying, transportation, stacking, bagging and packing areas to control fugitive dust emissions.</li> <li>• All internal roads / area are built of concrete to control fugitive emissions during road transportation.</li> <li>• We have also provided Road Vacuum sweeper machine, to control fugitive dust emissions.</li> </ul>
4.	Industrial waste water shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 <sup>th</sup> May 1993, and 31 <sup>st</sup> December, 1993 or as amended from time to time. The treated wastewater shall be utilized for plantation purpose.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
5.	The overall noise levels in and around the plant area shall be kept well within the standards 85 dB(A) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all the sources of noise generation. The ambient noise levels should confirm to the standards prescribed under EPA Rules, 1989 viz 75 dBA (day time) and 70 dBA (nighttime)	<ul style="list-style-type: none"> <li>• We are taking all the precautionary measures to control the noise pollution and ensure that the noise will be well within specified standards 85 dB(A).</li> <li>• Regular noise level monitoring is being conducted at plant site and mines area.</li> </ul>
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"> <li>• Being complied</li> <li>• To harvest rain water, company has constructed 54 rain water harvesting systems with a rain water harvesting potential of 1583038 m<sup>3</sup>/year @ rainfall of 960 mm.</li> </ul>
7.	All the recommendations of the CREP guidelines	<ul style="list-style-type: none"> <li>• Noted &amp; being followed</li> </ul>

	shall be strictly 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"> <li>• <b>Noted &amp; being complied.</b></li> </ul>
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"> <li>• <b>Company is doing its CSR activity for the socio-economic development of nearby 07 Villages.</b></li> </ul>
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 implement 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"> <li>• <b>We have incurred expenditure of Rs. 83.23 Crore for the installation of Air pollution control equipments which is under operation with the capacity of 1.98 MTPA clinker, 05 MTPA cement production &amp; 08 MW Waste heat recovery based Power Plant and 4.8 MTPA Limestone mine from ML-1 and ML-2.</b></li> <li>• <b>For the socio economic development we have adopted 07 nearby villages and implementing the CSR programs in these villages.</b></li> <li>• <b>The detailed CSR action plan (40 years) have been submitted to MoEF &amp; CC vide letter number b-1011/3/2008-M&amp;MP Dated 15.02.2010</b></li> </ul>
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"> <li>• <b>Half Yearly Environment Compliance report being regularly submitted to Regional Offices of CPCB (Bhopal), MoEF &amp; CC (Nagpur) and CECB (Raipur).</b></li> </ul>
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 <a href="http://envfor.nic.in">http://envfor.nic.in</a> .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"> <li>• <b>To inform public about the accordance of environment Clearance, an advertisement was published in local newspapers and a copy of the same was forwarded to than Regional office of MoEF &amp; CC at Bhopal.</b></li> <li>• <b>Copy of Environment clearance has also been uploaded on the company website</b></li> </ul>
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"> <li>• <b>Already complied vide our letter no JKLC/Durg/Env/1206 dated 15.06.2011 and company is following the year starts from April &amp; ends in March (April-March) for the financial matters.</b></li> </ul>

## **HALF YEARLY COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE**

(For the period of Oct. 2018 to March 2019)

(Ref : EC Amendment on 27<sup>th</sup> February 2010)

<b>S. No.</b>	<b>CONDITION</b>	<b>COMPLIANCE STATUS</b>
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"><li>• <b>The details of CSR activities &amp; incurred expenditure is enclosed as Annexure - III</b></li></ul>
2.	The National Ambient Air Quality Emission Standards issued by the Ministry vide GSR No.826 (E) dated 16 <sup>th</sup> November, 2009 shall be followed.	<ul style="list-style-type: none"><li>• <b>Being complied</b></li></ul>
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"><li>• <b>Complied</b></li></ul>
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 <sub>2</sub> ,NO <sub>x</sub> (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"><li>• <b>Being Complied.</b></li><li>• <b>The environment Compliance report including monitoring data is being uploaded on the company website.</b></li><li>• <b>Copy of the compliance report is being submitted to the Regional office of MoEF &amp; CC, Nagpur, CPCB Zonal office Bhopal and Regional office CECB Bhilai regularly.</b></li><li>• <b>Environmental 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.</b></li></ul>
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 monitor the Stipulated conditions.	<ul style="list-style-type: none"><li>• <b>Half yearly Monitoring report for the period of October 18 to March 19 was submitted on 30<sup>th</sup> April 2019, is attached in Annexure IV.</b></li></ul>
6.	The Environmental statement for each financial year ending 31 <sup>st</sup>	<ul style="list-style-type: none"><li>• <b>Environment statement for last</b></li></ul>

	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.	<b>year was submitted on 21.06.2018</b>
<b>7.</b>	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 <a href="http://envfor.nic.in">http://envfor.nic.in</a> . 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"> <li>• <b>Already Complied</b></li> </ul>
<b>8.</b>	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"> <li>• <b>Already Complied vide our letter No JKLC/Durg/Env/1206 Dated 15.06.2011.</b></li> </ul>

**HALF YEARLY COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE**

*(For the period of Oct. 2018 to March 2019)*

**( Ref : EC Amendment regarding change of mode of limestone transport from mines to Cement Plant on 23<sup>rd</sup> July 2015.)**

**Additional Specific Condition**

<b>S No.</b>	<b>CONDITION</b>	<b>COMPLIANCE STATUS</b>
1	Trucks engaged for limestone transportation shall be optimally loaded and covered with tarpaulin with no spillage en route. The trucks shall be properly maintained and emission shall be below notified limits. Facilities for parking of trucks carrying limestone shall be created within the plant site.	<ul style="list-style-type: none"><li>• <b>Limestone is being transported in duly-covered vehicles with tarpaulin to avoid fugitive dust emission during transportation.</b></li></ul>
2	Vehicular pollution due to transportation of raw material and finished product shall be controlled. Proper arrangement shall also be made to control just emission during loading, and unloading of the raw material and finished product.	<ul style="list-style-type: none"><li>• <b>All transfer points, Junction loading and unloading points are equipped with efficient dust extraction system to maintain the particulate matter below 30mg/nm<sup>3</sup>.</b></li><li>• <b>Dust suppression system (water Sprinkler) is provided at Limes stone unloading point.</b></li><li>• <b>Dust suppression system being installed at all loading unloading points of lime stone stacker area.</b></li><li>• <b>02 Water tankers have been engaged for water sprinkling on road to control the fugitive dust emission during transportation of lime stone from mining pit.</b></li></ul>
3	All approach roads shall be black topped and the eternal roads shall be connected. The roads shall be regularly cleaned with mechanical sweepers.	<ul style="list-style-type: none"><li>• <b>All internal roads are pucca - Concrete and the roads are being clean regularly cleaned with mechanical sweepers.</b></li></ul>

**HALF YEARLY COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE**

*(For the period of Oct. 2018 to March 2019)*

**( Ref : EC Amendment regarding reduction of mining lease area from 281.339 ha to 251.105 ha and interception of Ground Water Table during mining operation on 20 th July 2018.)**

<b>S No.</b>	<b>CONDITION</b>	<b>COMPLIANCE STATUS</b>
1	This environmental clearance will not be operational till such time the project proponent complies with all the statutory requirements and judgment of hon'ble Supreme Court dated the 2 <sup>nd</sup> Aug 2017 in write petition (Civil) No. 114 of 2014 in the matter of common cause versus union of India and Ors , if any applicable to this project.	<ul style="list-style-type: none"><li>• <b>Noted</b></li></ul>
2	The department of mines and geology govt. of Chhattisgarh shall ensure that mining operation shall not commence till the entire compensation levied, if any for illegal mining paid by the project proponent through their respective department of mining geology in strict compliance of judgment of Honble supreme court dated 2nd Aug 2017 in writ petition (Civil) No. 114 of 2014 in the matter of common cause versus union of India and Ors.	<ul style="list-style-type: none"><li>• <b>Noted</b></li></ul>
3	The regular monitoring of ground water table to be carried out by establishing a network of existing wells and constructing new piezometers. The reports shall be submitted at interval of six month to the regional office of the ministry and CG Pollution control board.	<ul style="list-style-type: none"><li>• <b>For Regular Ground water levels monitoring 04 Peizometers have been installed at plant site and 04 at Mines area. The reports are being submitted to the regional office of the ministry and CECB every six months.</b></li></ul>
4.	The water balance / water auditing shall be carried out and measures for reducing the consumption of waters shall be taken up and reported to the regional office of the ministry and CG Pollution control board.	<ul style="list-style-type: none"><li>• <b>Water meters have been installed on all tube wells for monitoring of ground water withdrawal. Regular monitoring of water consumption on monthly basis is being carried out.</b></li></ul>
5	The regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be maintain and submitted to the at interval of six months to the regional office of the ministry and CG Pollution control board .	<ul style="list-style-type: none"><li>• <b>Regular monitoring of water quality upstream and downstream of water bodies is being carried out and record of monitoring data is being maintained and submitted to the regional office of the ministry and CECB.</b></li><li>• <b>The ground water quality is being monitored during pre</b></li></ul>

		monsoon and post monsoon.
6	The plantation / greenbelt at the periphery of the water body, particularly on eastern and western boundaries, shall be maintained in the mined out area in order to reduce the loss of surface water.	<ul style="list-style-type: none"> <li>• Being complied</li> <li>• A 3-tier avenue plantation along the roads and along the lease boundary has been done. Local species have been given importance.</li> <li>• Company carried out plantation programs in schools and villages. Saplings are distributed to schools and villages. A total of 5598 Plants have been planted in nearby by villages.</li> <li>• Two water tankers have been allocated for watering these plants.</li> </ul>

**HALF YEARLY COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE**

*(For the period of Oct. 2018 to March 2019)*

**(Ref : EC amendment regarding change in configuration of clinker production of 1.5 MTPA to 1.98 MTPA on 14 th November , 2018)**

Sr No.	CONDITION	COMPLIANCE STATUS
1	An amount of Rs. 15.5 lakhs shall be spent towards corporate environmental responsibility as per office memorandum of the ministry dated 30 <sup>th</sup> May 2018 by the end of 2019.	<ul style="list-style-type: none"><li>• <b>Being complied. Details attached as - Annexure V</b></li></ul>
2	The air pollution control devices should be upgraded to meet the requirement of additional pollution load and shall meet the standards.	<ul style="list-style-type: none"><li>• <b>State of Art Air Pollution Control Equipments have been installed at various sections to meet the requirement of additional pollution load thereby meeting the standards as prescribed. All air pollution control equipments are interlocked with production line and any failure of APCEs will automatically stop the unit till rectified and restarted section.</b></li></ul>
3	The proposed configuration of the plant shall be commissioned within the valid period of environment Clearance.	<ul style="list-style-type: none"><li>• <b>Noted and Agreed</b></li></ul>

## 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	Designed By	Shree Conveyer
8	Belt Supplied by	Bridgestone, Japan
9	Total work Completed	80 %
10	Total Work Pending	20 %

## Pipe Conveyor Progress:





**PLANTATION WITHIN PLANT AREA**

**Annexure –II**



**PLANTATION IN MINES AREA**



## IN HOUSE NURSERY DEVELOPMENT

JK Lakshmi Cement Ltd has in house nursery at plant and mines area, in which near about 25,000 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.



**CSR EXPENDITURE**  
**From October 2018 to March 2019**

**Annexure –III**

Sl. No.	Operational Area	2018-19
		Expenses (Lakh)
<b>1</b>	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	<b>11.17</b>
<b>2</b>	Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and the differently able and livelihood enhancement projects	<b>11.81</b>
<b>3</b>	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	<b>6.85</b>
<b>4</b>	Rural development projects	<b>0.15</b>
	<b>Total</b>	<b>29.98</b>

**MAJOR CSR ACTIVITIES**

**A. EDUCATION INTERVENTION**

From April 2018, Tuition classes have started for 110 students in four centers at Semaria, Nandini Khundni, Khasadih and Girhola Village.

**B. VOCATIONAL TRAININGS**

Computer literacy classes were conducted for students. A total of 38 students passed out in the computer literacy program which includes 15 Girls and 23 Boys, in last quarter.

**C. COMMUNITY LIBRARY**

Currently we are operating library at Nandini-Khundini village. The library attracted 2678 users during this quarter. Library has about 2400 books including story books, religious books, books on skill development, books on health and agriculture etc. Newspapers are integral part of these libraries. Library has separate timings for women in the afternoon.

Approximately 1000 users visit to library every month. Establishment of Community library at Nandini Village. Library could attract 5683 users during this period.

#### **D. MEDICAL AND HEALTH CARE**

- **HEALTH CAMP:-** Organized total 137 general health camps in which total 5204 patient got benefited including 2106 male and 4180 female
- **Health Awareness Programs:** Survey work for pregnant and lactating women was done in this quarter
- **Disease Control :** Monthly Fogging to control malaria and mosquito growth

#### **E. RURAL SANITATION**

- **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
- To control the mosquito growth and to control the malaria in nearby villages regular fogging was done in nearby 7 villages once in a month. Approximate 5000 family are benefited in this activity.

#### **F. WOMEN EMPOWERMENT**

- **Self Help Group (SHG) formation:** We have formed 13 Self Help Group for women, For the purpose of promoting women's integrity, whose aim is to create a savings in them and collectively promote income with unity. The second objective is to provide information about the schemes run by the government and to make them aware. At the same time, there is also awareness about education, health and sanitation; we have formed self help groups for women only in all the affected villages of our project.
- **Silai Kadhai Centers:** In this quarter 174 women benefited from Tailoring Training center. Total 06 centers are running in the six villages. After completing 03 month course of Silai Kadhai now they are able to stitch Blouse, Peticcoat, Lehanga, Salwar Suit, Bags etc., In this quarters.

We had organized training programs for members of self Help Group in our periphery village. The topics are covered is Saving, Inter loaning, Documentation and Income generation related activities. 20 members are participating in this training. The date of meeting is decided by all the members of the group. The meeting of each month will be held in that date.

- G. Infrastructure to Villages:** As per community demand we are constructed passenger shelter (bus Stop) at Main Road Shemariya (Mining village).

- H. ENVIRONMENT:** Under Harihar Chhattisgarh project 5598 no. of plants have been planted at Nearby Village. Two Water tankers have been employed for watering these plants.

**EXPENDITURE TOWARDS CER****Annexure –V**

- An amount of around Rs. 1,550 Lakh will be incurred towards expenditure for carrying out up-gradation / optimization activities.
- As per MOEF&CC Circular NO. 22-65/2017-IA-III dated 01.05.2018, we propose to make an expenditure of 1% of additional capital investment, in area around our project under Corporate Environment Responsibility (CER ).

<b>S.No</b>	<b>Proposed Activities under CER at nearby villages</b>	<b>Amount to be incurred Rs.</b>	<b>Exp.</b>	<b>Villages for CER activities</b>
1	Plantation in Community Area / Avenue Plantation	5.0 L	5.5	Plantation work at Nandani Khundani, Pitaura, Girhola, Khasadih
2	Establishment of Library to improve the quality of Educational	5.0 L	5.77	Establishment and Renovation of Community library at Nandini Khundani
3	Rain Water harvesting systems	2.0 L	2.2	Unit Establishment and Awareness program of Rain Water harvesting systems at Khasadih, Pitaura & Semaria
4	Hygiene & Rural Sanitation	2.0 L	2.1	Under Sanitation Program JKLC has deputed 03 Number of Garbage Tippler to collect garbage from door step at Khasadih.  To control the mosquito growth and to control the malaria in nearby villages regular fogging work at Khasadih villages once in a month.
5	Establishment of Skill Development Centre	2.0 L	2.05	Establishment & Renovation of skill development center at Girhola
	<b>TOTAL</b>	<b>16.0 L</b>	<b>17.62</b>	

# ENVIRONMENTAL STATUS REPORT

(Half-yearly Report for October-2018 to March-2019)

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**

**Head Office:** 20, IT Park, Parsodi, Nagpur- 440022 (M.S.)  
web: [smsl.co.in](http://smsl.co.in), mail: [vijay.gupta@smsl.co.in](mailto:vijay.gupta@smsl.co.in)

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

**MARCH - 2019**



'MoEF' RECOGNIZED ENVIRONMENTAL LABORATORY  
VALIDITY UPTO 08.02.2022

जहाँ है हरियाली।  
यहाँ 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-2018 to March-2019** (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 : 19.04.2019



  
Dr. D. G. BATTALWAR  
Authorized Signatory



ISO 9001 : 2008 C No. : 49121/A/001/UK/En  
ISO 14001 : 2004 C No. : 49121/B/001/UK/En  
OHSAS 18001 : 2007 C No. : 49121/C/001/UK/En

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CIN- U40105MH2005PLC150780

**MAHARASHTRA  
ENVIRO POWER LIMITED**

(NAGPUR UNIT)

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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-2018 to March-2019**.

## SUMMARIZED ENVIRONMENTAL BASELINE DATA FOR PERIOD OCTOBER-2018 TO MARCH-2019

Regular environmental monitoring in & around the Integrated Cement Plant area is carried out. 'Summarized Environmental Baseline Data' for the period October-2018 to March-2019 is presented below.

### MICRO-METEOROLOGICAL DATA

#### 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-2018 to March-2019**

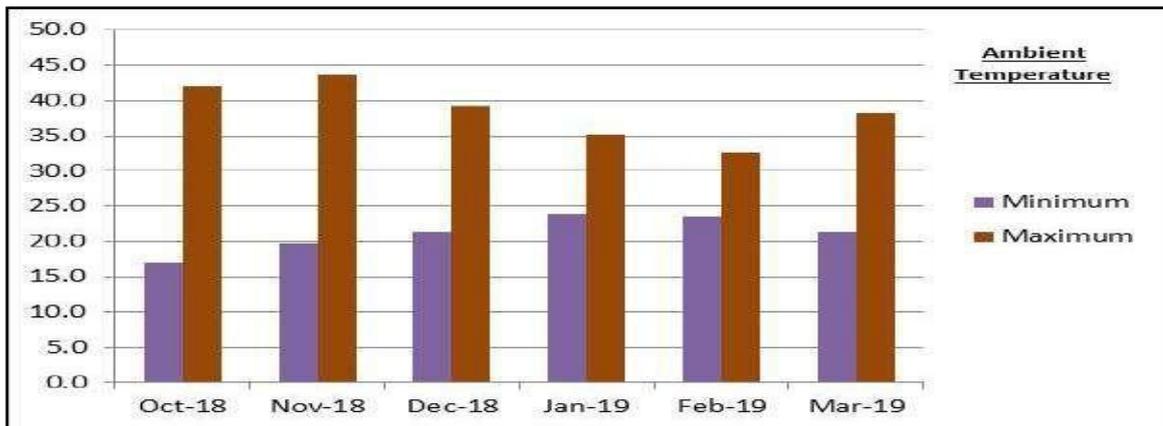
Sr. No.	Months	Minimum	Maximum
<b>WIND SPEED (km/hr)</b>			
1.	October - 2018	0.0	3.5
2.	November - 2018	0.0	2.6
3.	December - 2018	0.0	3.3
4.	January - 2019	0.0	2.9
5.	February - 2019	0.0	5.2
6.	March - 2019	0.0	5.4
<b>AMBIENT TEMPERATURE (°C)</b>			
1.	October - 2018	16.4	34.0
2.	November - 2018	13.3	32.7
3.	December - 2018	8.3	27.7
4.	January - 2019	8.5	30.0
5.	February - 2019	10.1	34.4
6.	March - 2019	13.9	37.1

table contd...

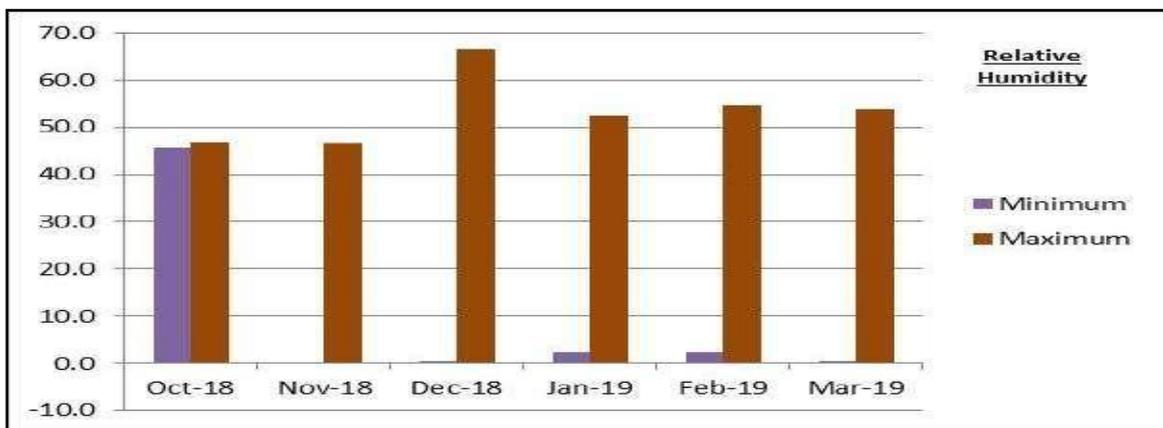
table contd...

<b>RELATIVE HUMIDITY (%)</b>			
1.	October - 2018	14.8	52.6
2.	November - 2018	0.1	51.2
3.	December - 2018	1.5	53.9
4.	January - 2019	0.1	53.7
5.	February - 2019	13.0	53.2
6.	March - 2019	9.3	52.2
<b>ATMOSPHERIC PRESSURE (mm-Hg)</b>			
1.	October - 2018	834.5	848.9
2.	November - 2018	829.2	845.2
3.	December - 2018	827.7	859.6
4.	January - 2019	828.4	859.0
5.	February - 2019	827.3	853.1
6.	March - 2019	819.3	846.8

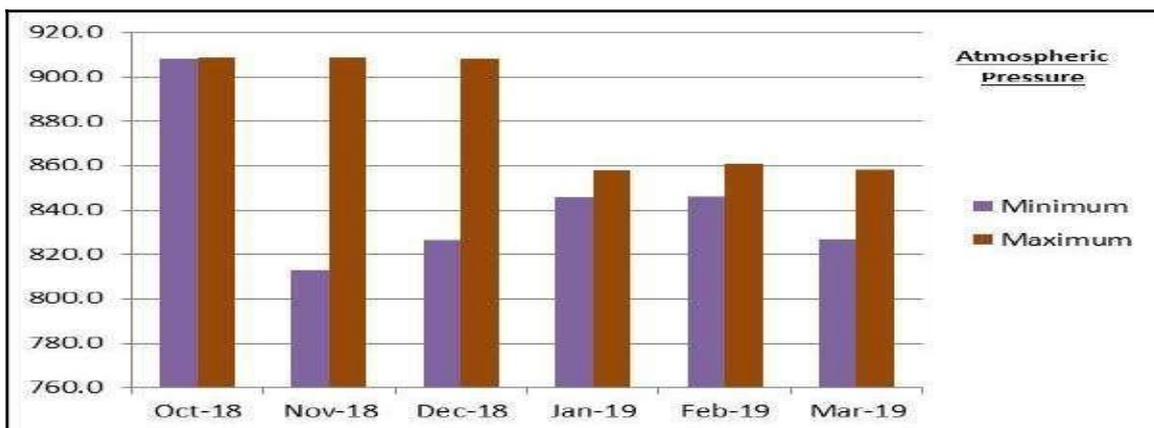
**Graphical Presentation of Ambient Temperature**



**Graphical Presentation of Relative Humidity**



### Graphical Presentation of Atmospheric Pressure



## RESULTS AND DISCUSSION

Total **rainfall** for the period October-2018 to March-2019 was 90.5 mm and out of which, 46.0 mm rainfall was found in month December-2018.

Mostly **wind** was found calm (<1.0 km/hr) and maximum time wind was predominated from South-West direction during period October-2018 to March-2019. Maximum wind speed was observed in month of March-2019 and speed was 5.4 km/hr.

Ambient **temperature** was monitored on hourly basis for minimum & maximum during period October-2018 to March-2019. Observed minimum temperature was 8.3 °C in month December-2018 and maximum temperature was 37.1 °C in month March-2019.

Relative **humidity** was monitored on hourly basis for minimum & maximum during period October-2018 to March-2019. Observed minimum humidity was 0.1% in months November-2018 & January-2019 and maximum humidity was 53.9% also in month December-2019.

**Atmospheric pressure** was monitored on daily basis during period October-2018 to March-2019. Observed minimum atmospheric pressure was 819.3 mm-Hg in month March-2019 and maximum atmospheric pressure was 859.6 mm-Hg in months December-2018.

## AMBIENT AIR QUALITY (AAQ)

Monitored Ambient Air Quality values (parameter-wise) in & around the plant site for the period October-2018 to March-2019 are given below in **Table- 2.2** to **Table- 2.6**.

**TABLE – 2.2: PM<sub>10</sub> Particulate Matter (<10 µm)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	55.1	52.5	49.7	53.4	55.7	57.6	49.7	57.6	54.0	57.4
AAQ-2	Boundary towards North-East Direction	57.4	55.1	53.3	77.2	79.5	82.7	53.3	82.7	67.5	82.4
AAQ-3	Boundary towards East Direction	54.7	51.3	48.5	58.6	61.1	64.5	48.5	64.5	56.5	64.2
AAQ-4	Boundary towards North Direction	58.8	57.2	55.4	65.5	67.9	71.3	55.4	71.3	62.7	71.0
AAQ-5	Boundary towards South West Direction	55.3	54.6	51.8	51.8	53.4	57.3	51.8	57.3	54.0	57.1

**TABLE – 2.3: PM<sub>2.5</sub> Particulate Matter (<2.5 µm)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	21.5	20.9	18.6	28.1	29.3	31.4	18.6	31.4	25.0	31.2
AAQ-2	Boundary towards North-East Direction	22.4	21.2	20.8	45.6	46.8	49.3	20.8	49.3	34.4	49.1
AAQ-3	Boundary towards East Direction	20.8	19.8	18.4	28.3	29.6	31.2	18.4	31.2	24.7	31.0
AAQ-4	Boundary towards North Direction	22.9	22.2	21.3	30.7	32.2	34.5	21.3	34.5	27.3	34.3
AAQ-5	Boundary towards South West Direction	21.6	20.7	19.7	23.4	24.7	26.8	19.7	26.8	22.8	26.6

**TABLE – 2.4: Sulphur Dioxide (SO<sub>2</sub>)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	15.7	16.3	18.9	17.6	15.8	13.2	13.2	18.9	16.3	18.8

AAQ-2	Boundary towards North-East Direction	14.5	15.8	17.2	19.5	17.4	15.6	14.5	19.5	16.7	19.3
AAQ-3	Boundary towards East Direction	15.1	16.9	18.4	16.7	14.2	13.6	13.6	18.4	15.8	18.3
AAQ-4	Boundary towards North Direction	13.8	15.2	18.1	15.4	13.6	12.8	12.8	18.1	14.8	17.8
AAQ-5	Boundary towards South West Direction	13.3	16.4	17.6	14.9	13.3	11.4	11.4	17.6	14.5	17.5

**TABLE – 2.5: Oxides of Nitrogen (NO<sub>x</sub>)**

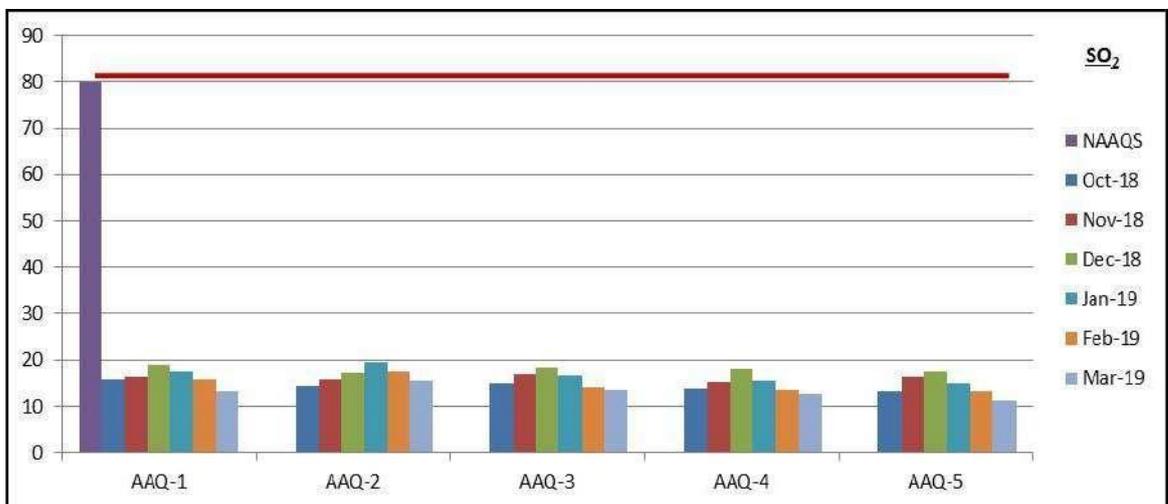
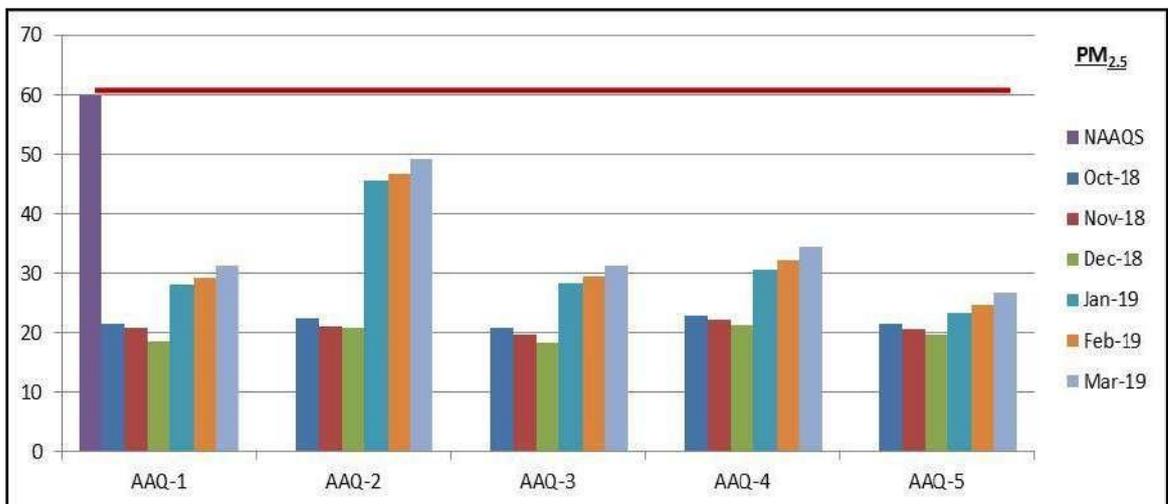
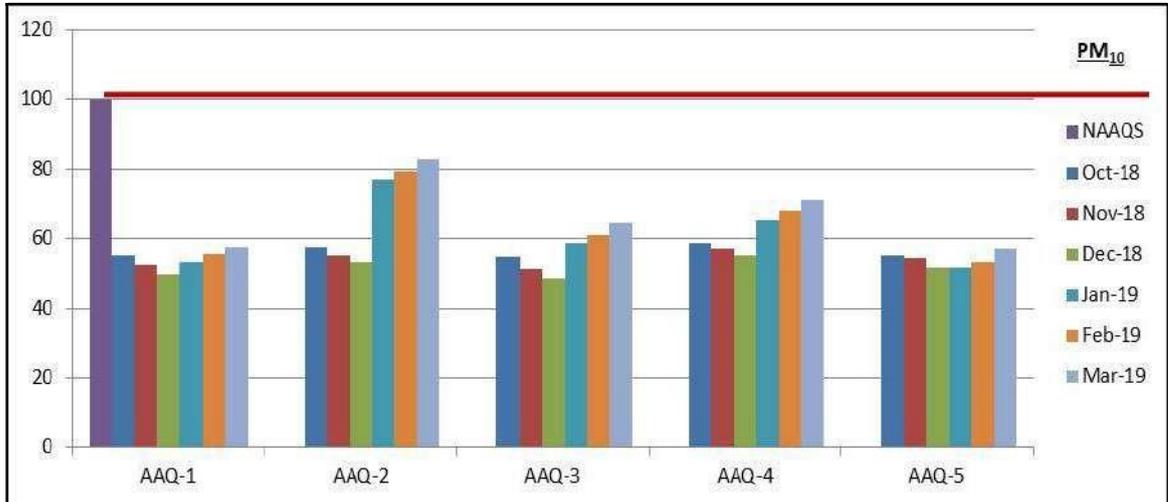
Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	16.5	17.1	19.3	24.3	21.5	19.1	16.5	24.3	19.6	24.0
AAQ-2	Boundary towards North-East Direction	18.6	19.9	21.5	18.2	16.7	14.8	14.8	21.5	18.3	21.3
AAQ-3	Boundary towards East Direction	15.2	16.8	18.4	26.5	23.4	19.8	15.2	26.5	20.0	26.2
AAQ-4	Boundary towards North Direction	14.9	16.2	17.8	20.7	18.1	17.4	14.9	20.7	17.5	20.4
AAQ-5	Boundary towards South West Direction	14.3	15.7	17.2	18.8	16.3	15.2	14.3	18.8	16.3	18.6

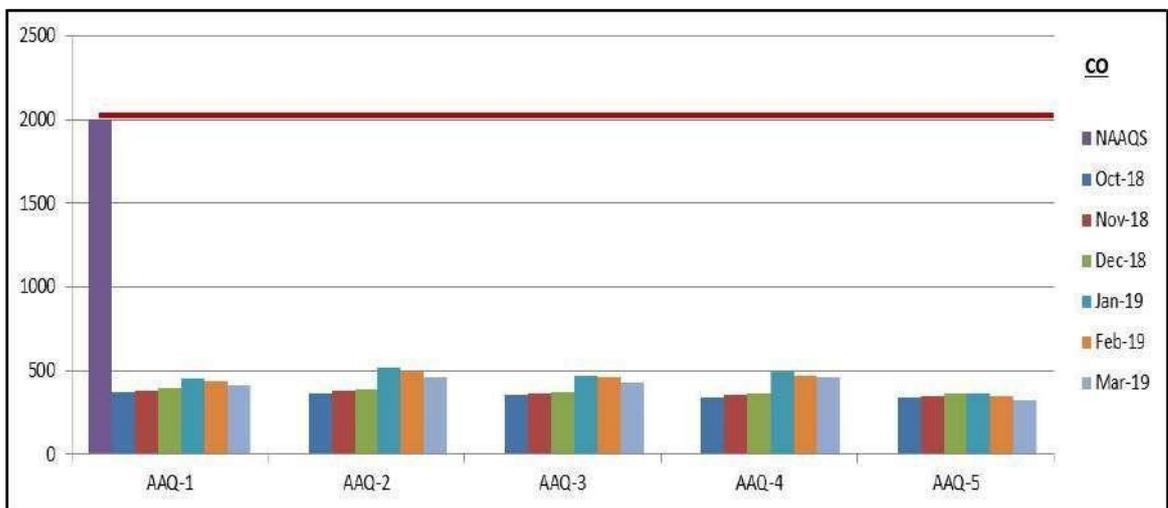
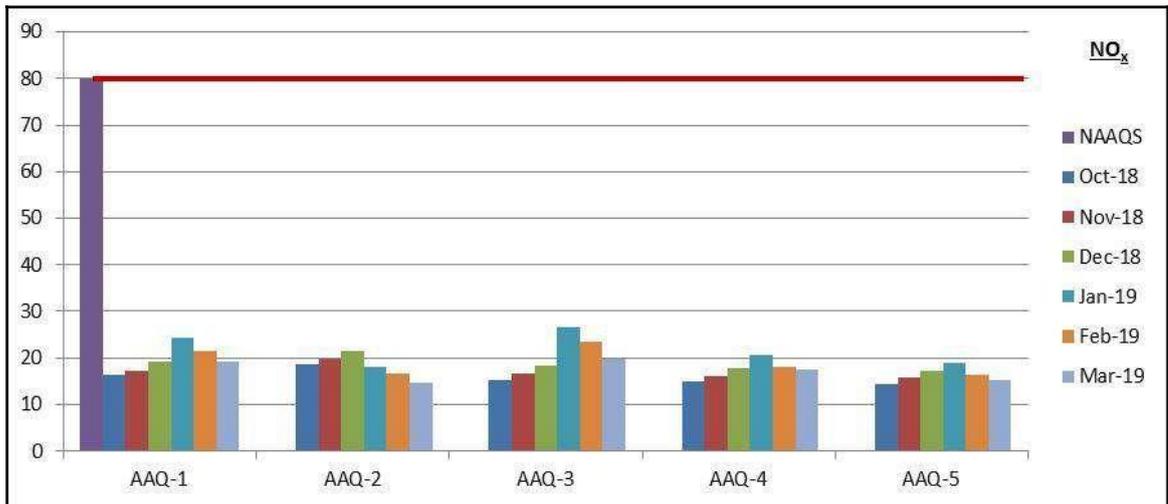
**TABLE – 2.6: Carbon Monoxide (CO)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	375	384	396	456	438	412	375	456	410	454
AAQ-2	Boundary towards North-East Direction	368	381	392	517	494	465	368	517	436	515
AAQ-3	Boundary towards East Direction	356	362	374	474	458	429	356	474	409	472
AAQ-4	Boundary towards North Direction	343	355	368	493	471	458	343	493	415	491
AAQ-5	Boundary towards South West Direction	339	347	361	361	349	322	322	361	347	361

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

**Figure – 2.1: GRAPHICAL PRESENTATION (Parameter-wise)**





### 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).

## 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-2018 to March-2019 are given below in **Table-2.7** & **Table-2.8**.

**TABLE – 2.7: NOISE LEVEL (DAY HOURS)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG
NL – 1	Boundary towards West Direction	43.6	42.2	41.5	43.6	42.2	44.3	41.5	44.3	42.9
NL – 2	Boundary towards North-East Direction	47.3	45.8	45.4	47.3	45.8	47.6	45.4	47.6	46.5
NL – 3	Boundary towards East Direction	43.2	41.7	41.1	43.2	41.7	48.2	41.1	48.2	43.2
NL – 4	Boundary towards North Direction	48.5	47.3	46.8	48.5	47.3	52.7	46.8	52.7	48.5
NL – 5	Boundary towards South West Direction	45.1	44.4	42.6	45.1	44.4	49.4	42.6	49.4	45.2

**TABLE – 2.8: NOISE LEVEL (NIGHT HOURS)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG
NL – 1	Boundary towards West Direction	37.1	35.9	35.3	37.1	35.9	39.5	35.3	39.5	36.8
NL – 2	Boundary towards North-East Direction	42.6	41.2	40.9	42.6	41.2	45.8	40.9	45.8	42.4
NL – 3	Boundary towards East Direction	39.3	37.9	37.4	39.3	37.9	46.4	37.4	46.4	39.7
NL – 4	Boundary towards North Direction	43.2	42.1	41.7	43.2	42.1	51.2	41.7	51.2	43.9
NL – 5	Boundary towards South West Direction	39.7	38.3	37.5	39.7	38.3	48.6	37.5	48.6	40.4

## 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.

## 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-2018 to March-2019 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	-
<b>October-2018</b>								
Ambient Temperature	°C	30.0	32.0	30.0	29.0	31.0	31.0	-
Flue Gas Temperature	°C	107.0	111.0	74.0	75.0	78.0	80.0	-
Velocity	m/s	6.5	7.3	6.7	6.8	6.5	7.2	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	158.0	61.4	36.7	9.3	8.9	93.0	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	27.8	26.1	25.4	27.2	25.5	26.9	<50.0
<b>November-2018</b>								
Ambient Temperature	°C	32.0	33.0	32.0	31.0	31.0	32.0	-
Flue Gas Temperature	°C	104.0	110.0	75.0	76.0	78.0	79.0	-
Velocity	m/s	6.4	7.1	6.7	6.5	6.8	7.2	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	155.5	59.7	36.7	8.9	9.3	93.0	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	25.2	27.8	26.1	25.7	26.4	28.1	<50.0

**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	-
<b>December-2018</b>								
Ambient Temperature	°C	29.0	31.0	30.0	28.0	29.0	29.0	-
Flue Gas Temperature	°C	102.0	108.0	74.0	73.0	75.0	76.0	-
Velocity	m/s	6.2	7.1	6.4	6.6	6.5	6.9	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	150.7	59.7	35.1	9.0	8.9	89.1	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	25.4	26.2	27.3	25.8	26.5	26.7	<50.0
<b>January-2019</b>								
Ambient Temperature	°C	28.0	29.0	28.0	28.0	28.0	28.0	-
Flue Gas Temperature	°C	106.0	229.0	79.0	78.0	77.0	78.0	-
Velocity	m/s	6.7	7.4	7.3	6.7	6.8	7.2	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	162.8	62.2	40.0	9.2	9.3	93.0	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	26.3	26.9	25.5	23.8	26.1	27.4	<50.0

**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	-
<b>February-2019</b>								
Ambient Temperature	°C	30.0	31.0	29.0	30.0	30.0	31.0	-
Flue Gas Temperature	°C	108.0	231.0	80.0	78.0	76.0	79.0	-
Velocity	m/s	6.8	7.5	7.3	6.6	6.9	7.1	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	165.3	63.1	40.0	9.0	9.4	91.7	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	27.8	25.4	26.9	24.2	25.7	28.2	<50.0
<b>March-2019</b>								
Ambient Temperature	°C	37.0	37.0	37.0	37.0	37.0	37.0	-
Flue Gas Temperature	°C	111.0	239.0	82.0	79.0	80.0	81.0	-
Velocity	m/s	7.2	7.9	7.8	6.9	7.3	7.5	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	175.0	66.4	42.7	9.4	10.0	96.9	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	26.1	27.8	24.6	22.1	24.7	28.9	<50.0

## RESULTS & DISCUSSION

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

## WATER (GROUND & SURFACE) QUALITY

### 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.

### 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 October-2018 to March-2019, are presented below in **Table – 2.11 & Table – 2.12**.

**TABLE – 2.11: GROUND & SURFACE WATER QUALITY REPORT**

Date of Sampling			13.12.2018						
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values				
			Desirable	Permissible	GW-1	GW-2	GW-3	GW-4	SW-1
<b>A.</b>	<b>ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT</b>								
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	4.3
5.	Total Dissolved Solids	mg/l	500	2000	584.0	572.0	576.0	564.0	368.0
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.23	7.17	7.19	7.22	7.89
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.9	3.8	3.7	3.8	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	20.0
10.	Conductivity	µS/cm	-	-	908.0	882.0	894.0	886.0	582.0
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	224.0	232.0	212.0	216.0	158.0
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	232.0	214.0	224.0	228.0	152.0
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	60.3	55.6	58.2	59.3	39.5
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	19.5	18.0	18.8	19.2	12.8
15.	Chlorides as Cl	mg/l	250	1000	78.0	69.0	73.0	68.0	44.0
16.	Sulphates as SO <sub>4</sub>	mg/l	200	400	51.1	49.5	64.2	55.4	19.8

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	0.52	0.59	0.54	0.61	0.06
18.	Nitrates as NO <sub>3</sub>	mg/l	45	NR	5.1	8.2	9.6	10.4	3.7
19.	Iron as Fe	mg/l	0.3	NR	0.15	0.19	0.18	0.16	0.03
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	149
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	0	21
<b>B.</b>	<b>TOXIC SUBSTANCES</b>								
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			08.03.2019						
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values				
			Desirable	Permissible	GW-1	GW-2	GW-3	GW-4	SW-1
<b>A.</b>	<b>ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT</b>								
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	562	574	546	422
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	8	8	8	12
10.	Conductivity	µS/cm	-	-	882	876	888	862	664
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	210	224	208	202	172
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	224	216	218	216	168
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	58.2	56.2	56.7	56.2	43.7
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	18.8	18.1	18.3	18.1	14.1
15.	Chlorides as Cl	mg/l	250	1000	83	72	78	75	59
16.	Sulphates as SO <sub>4</sub>	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 <sub>3</sub>	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	70
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	0	11
<b>B.</b>	<b>TOXIC SUBSTANCES</b>								
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.

## SOIL QUALITY

### GENERAL

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

### 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

### OBSERVATIONS

The physico-chemical characteristics of soil sample for the period October-2018 to March-2019 have reported in **Table- 2.14 & Table- 2.15**.

**TABLE – 2.14: SOIL QUALITY REPORT**

Date of Sampling		13.12.2018		
Sr. No.	Parameters	Unit	S-1	S-2
<b>A.</b>	<b>Physical Properties</b>			
1.	Bulk Density	g/cc	1.33	1.25
2.	Particle Size Distribution	% Gravel	7.7	4.1
		% Sand	35.2	32.8
		% Silt	29.6	33.5
		% Clay	27.5	29.6

Table contd...

Table contd...

Sr. No.	Parameters	Unit	S-1	S-2
3.	Soil Texture	-	Clay Loam	Clay Loam
4.	Porosity	%	39.6	42.2
5.	Water Holding Capacity	%	33.5	36.8
<b>B.</b>	<b>Chemical Properties</b>			
1.	pH at 25 °C	-	7.11	6.82
2.	Electrical Conductivity	mmhos/cm	0.155	0.181
3.	Organic Carbon	%	0.43	0.78
4.	Cation Exchange Capacity	meq/100 gm	25.5	33.2
5.	Exchangeable Calcium as Ca <sup>++</sup>	mg/kg	48.4	62.6
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	14.6	21.9
7.	Chlorides as Cl	mg/kg	97.3	124.2
8.	Sulphate as SO <sub>4</sub>	mg/kg	106.8	141.5
9.	Nitrogen as N	kg/ha	104.3	456.7
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	63.7	134.3
11.	Potassium as K <sub>2</sub> O	kg/ha	111.2	297.5

**TABLE – 2.15: SOIL QUALITY REPORT**

Date of Sampling	08.03.2019
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Sr. No.	Parameters	Unit	S-1	S-2
<b>A.</b>	<b>Physical Properties</b>			
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>B.</b>	<b>Chemical Properties</b>			
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 <sup>++</sup>	mg/kg	47.9	62.3
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	14.5	21.2
7.	Chlorides as Cl	mg/kg	98.6	124.1
8.	Sulphate as SO <sub>4</sub>	mg/kg	103.9	143.4
9.	Nitrogen as N	kg/ha	92.5	346.7
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	67.4	112.5
11.	Potassium as K <sub>2</sub> O	kg/ha	99.6	291.8

## 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

## 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 1.33 & 1.25 and 1.31 & 1.23 g/cm<sup>3</sup> respectively.
- (b) Soil samples have 7.11 & 6.82 and 7.01 & 6.78 **pH value** respectively. The pH value is indicating neutral to slightly alkaline in nature.
- (c) Soil samples have **conductivity** 0.155 & 0.181 and 0.151 & 0.189 mmhos/cm respectively.
- (d) Soil samples have **Organic Carbon** 0.43 & 0.78 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 104.3 & 456.7 and 92.5 & 346.7 kg/ha respectively.
- (f) Soil samples have also sufficient concentration of **Available Phosphorous** as its value is 63.7 & 134.3 and 67.4 & 112.5 kg/ha respectively.
- (g) Soil samples have less concentration of **Available Potassium** as its value is 111.2 & 297.5 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.**

## TREATED WASTEWATER QUALITY

### 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.

### 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.

### OBSERVATIONS

The monthly characteristics of Sewage Treatment plant and WHR recycled water samples for the period from October-2018 to March-2019, 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.18	Nov.18	Dec.18	Jan.19	Feb.19	Mar.19
1.	pH	-	5.5-9.0	7.17	7.08	7.03	7.23	7.21	7.11
2.	BOD	mg/l	30	4.8	4.3	4.3	4.2	4.6	4.5
3.	COD	mg/l	250	24	20	20	20	24	24
4.	TSS	mg/l	100	10	8	8	8	10	8
5.	N-Total	mg/l	100	8.8	7.1	6.5	6.8	7.4	5.1
6.	NH4- N	mg/l	50	2.5	2.2	2.1	2.9	2.5	1.7

**TABLE – 2.18: WHR RECYCLED WATER QUALITY REPORT**

Sr. No.	Parameter	Unit	Standards as EPA-1986 (Schedule-VI)	Values					
				Oct.18	Nov.18	Dec.18	Jan.19	Feb.19	Mar.19
1.	pH	-	5.5-9.0	7.68	7.73	7.64	7.72	7.65	7.69
2.	BOD	mg/l	30	8.8	8.1	8.1	8.5	8.3	7.4
3.	COD	mg/l	250	40	36	36	36	36	32
4.	TSS	mg/l	100	20	16	18	12	14	14
5.	N-Total	mg/l	100	10.2	9.6	9.1	9.4	8.2	8.5
6.	NH4- N	mg/l	50	4.3	3.7	3.2	3.8	3.1	2.7

**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-2018 to March-2019)

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 - 2019**



'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-2018 to March-2019** (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 : **19.04.2019**

*Dr. D. G. BATTALWAR*  
Authorized Signatory



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CIN- U40105MH2005PLC150780

ISO 9001 : 2008 C No. : 49121/AJ/001/UK/En  
ISO 14001 : 2004 C No. : 49121/B/001/UK/En  
OHSAS 18001 : 2007 C No. : 49121/C/001/UK/En

**MAHARASHTRA  
ENVIRO POWER LIMITED**

(NAGPUR UNIT)

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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-2018 to March-2019**.

## SUMMARIZED ENVIRONMENTAL BASELINE DATA FOR PERIOD OCTOBER-2018 TO MARCH-2019

Regular environmental monitoring in & around the mine lease area is carried out. 'Summarized Environmental Baseline Data' for the period October-2018 to March-2019 is presented below.

### MICRO-METEOROLOGICAL DATA

#### 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-2018 to March-2019**

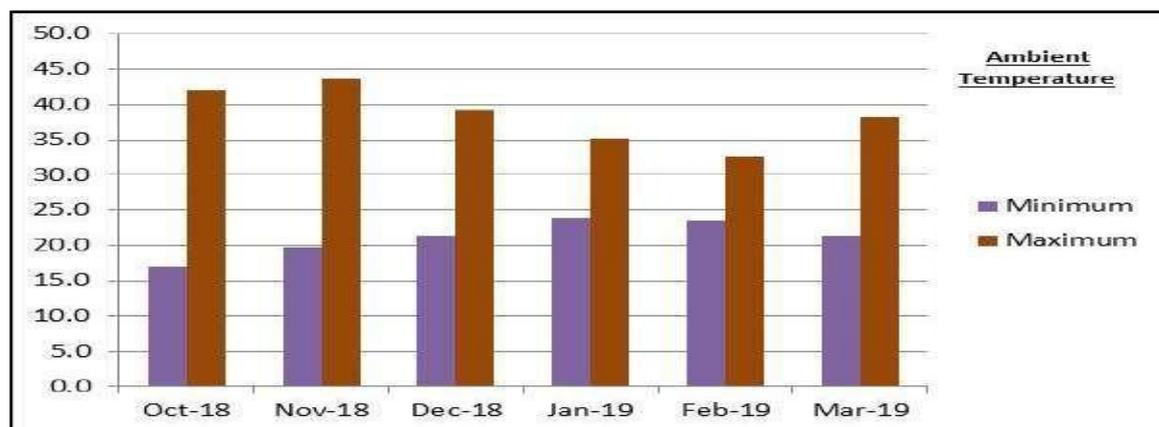
Sr. No.	Months	Minimum	Maximum
<b>WIND SPEED (km/hr)</b>			
1.	October - 2018	0.0	3.5
2.	November - 2018	0.0	2.6
3.	December - 2018	0.0	3.3
4.	January - 2019	0.0	2.9
5.	February - 2019	0.0	5.2
6.	March - 2019	0.0	5.4
<b>AMBIENT TEMPERATURE (°C)</b>			
1.	October - 2018	16.4	34.0
2.	November - 2018	13.3	32.7
3.	December - 2018	8.3	27.7
4.	January - 2019	8.5	30.0
5.	February - 2019	10.1	34.4
6.	March - 2019	13.9	37.1

table contd...

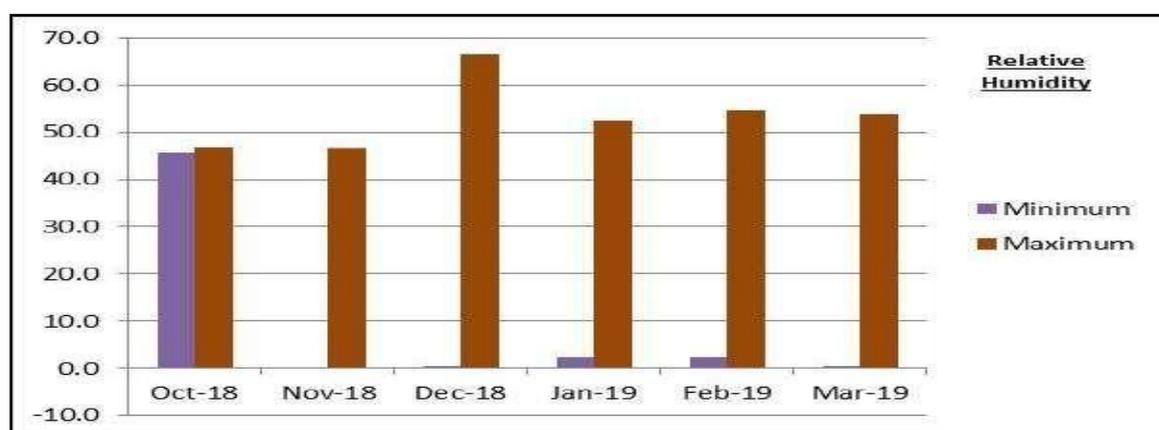
table contd...

<b>RELATIVE HUMIDITY (%)</b>			
1.	October - 2018	14.8	52.6
2.	November - 2018	0.1	51.2
3.	December - 2018	1.5	53.9
4.	January - 2019	0.1	53.7
5.	February - 2019	13.0	53.2
6.	March - 2019	9.3	52.2
<b>ATMOSPHERIC PRESSURE (mm-Hg)</b>			
1.	October - 2018	834.5	848.9
2.	November - 2018	829.2	845.2
3.	December - 2018	827.7	859.6
4.	January - 2019	828.4	859.0
5.	February - 2019	827.3	853.1
6.	March - 2019	819.3	846.8

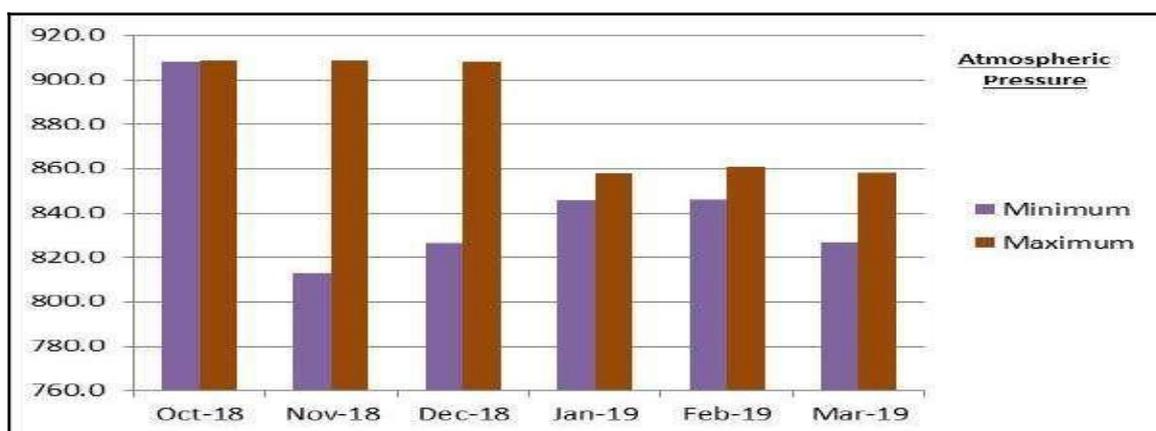
### Graphical Presentation of Ambient Temperature



### Graphical Presentation of Relative Humidity



### Graphical Presentation of Atmospheric Pressure



## RESULTS AND DISCUSSION

Total **rainfall** for the period October-2018 to March-2019 was 90.5 mm and out of which, 46.0 mm rainfall was found in month December-2018.

Mostly **wind** was found calm (<1.0 km/hr) and maximum time wind was predominated from South-West direction during period October-2018 to March-2019. Maximum wind speed was observed in month of March-2019 and speed was 5.4 km/hr.

Ambient **temperature** was monitored on hourly basis for minimum & maximum during period October-2018 to March-2019. Observed minimum temperature was 8.3 °C in month December-2018 and maximum temperature was 37.1 °C in month March-2019.

Relative **humidity** was monitored on hourly basis for minimum & maximum during period October-2018 to March-2019. Observed minimum humidity was 0.1% in months November-2018 & January-2019 and maximum humidity was 53.9% also in month December-2019.

**Atmospheric pressure** was monitored on daily basis during period October-2018 to March-2019. Observed minimum atmospheric pressure was 819.3 mm-Hg in month March-2019 and maximum atmospheric pressure was 859.6 mm-Hg in months December-2018.

## AMBIENT AIR QUALITY (AAQ)

Monitored Ambient Air Quality values (parameter-wise) in & around the mine lease area for the period October-2018 to March-2019 are given below in **Table- 2.2** to **Table- 2.6**.

**TABLE – 2.2: PM<sub>10</sub> Particulate Matter (<10 µm)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	57.6	55.3	53.8	51.5	54.6	59.2	51.5	59.2	55.3	59.0
AAQ-2	Lease Boundary towards North Direction	62.3	60.7	57.5	53.7	57.3	61.5	53.7	62.3	58.8	62.2
AAQ-3	Lease Boundary towards East Direction	61.8	58.5	56.1	46.4	48.8	52.6	46.4	61.8	54.0	61.5
AAQ-4	Lease Boundary towards South Direction	64.5	61.2	58.9	45.1	47.4	51.2	45.1	64.5	54.7	64.2
AAQ-5	Lease Boundary towards South-East	56.2	54.8	52.6	62.3	65.1	68.7	52.6	68.7	60.0	68.3

**TABLE – 2.3: PM<sub>2.5</sub> Particulate Matter (<2.5 µm)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	24.8	23.5	23.1	21.1	23.5	27.8	21.1	27.8	24.0	27.5
AAQ-2	Lease Boundary towards North Direction	29.3	28.5	26.9	23.6	25.2	30.7	23.6	30.7	27.4	30.6
AAQ-3	Lease Boundary towards East Direction	27.8	26.3	25.5	17.2	20.4	23.3	17.2	27.8	23.4	27.7
AAQ-4	Lease Boundary towards South Direction	30.3	28.8	28.2	19.4	19.7	20.9	19.4	30.3	24.6	30.2
AAQ-5	Lease Boundary towards South-East	24.7	24.1	23.3	28.5	29.8	32.3	23.3	32.3	27.1	32.1

**TABLE – 2.4: Sulphur Dioxide (SO<sub>2</sub>)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	14.8	16.6	19.1	18.9	17.5	15.4	14.8	19.1	17.1	19.1

AAQ-2	Lease Boundary towards North Direction	17.1	15.5	20.8	15.3	14.8	12.9	12.9	20.8	16.1	20.4
AAQ-3	Lease Boundary towards East Direction	16.2	17.2	18.9	13.6	12.3	11.7	11.7	18.9	15.0	18.7
AAQ-4	Lease Boundary towards South Direction	16.6	18.6	22.6	12.8	11.2	10.5	10.5	22.6	15.4	22.2
AAQ-5	Lease Boundary towards South-East	19.2	17.1	19.4	14.4	13.6	11.8	11.8	19.4	15.9	19.4

**TABLE – 2.5: Oxides of Nitrogen (NO<sub>x</sub>)**

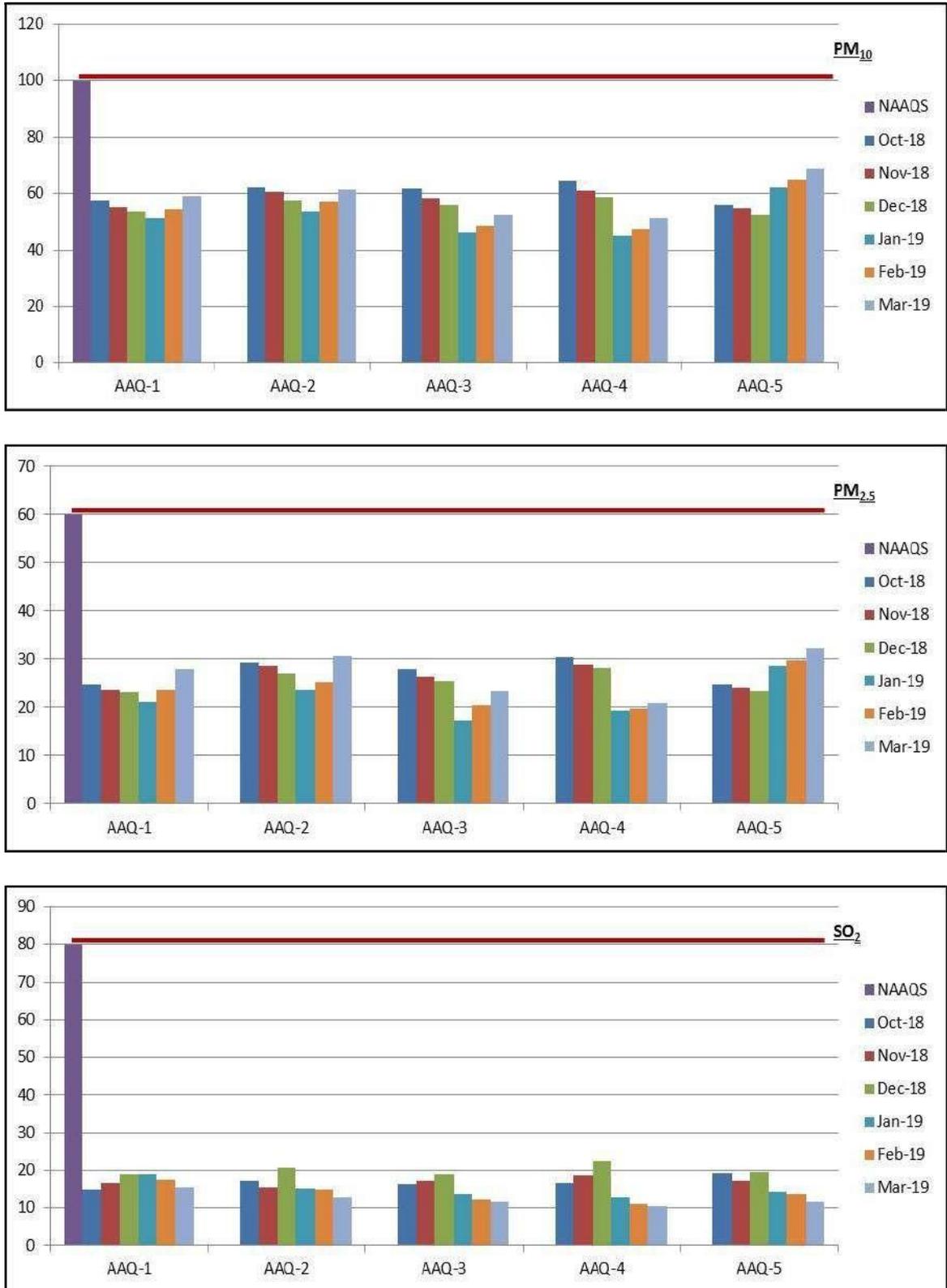
Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	20.6	21.4	24.3	24.3	22.8	21.5	20.6	24.3	22.5	24.3
AAQ-2	Lease Boundary towards North Direction	19.3	20.9	25.1	21.5	19.1	18.3	18.3	25.1	20.7	24.7
AAQ-3	Lease Boundary towards East Direction	18.6	20.2	22.2	18.2	17.4	15.9	15.9	22.2	18.8	22.0
AAQ-4	Lease Boundary towards South Direction	17.9	18.4	20.3	16.7	15.5	13.4	13.4	20.3	17.0	20.1
AAQ-5	Lease Boundary towards South-East	18.3	17.8	19.5	19.4	17.6	16.5	16.5	19.5	18.2	19.5

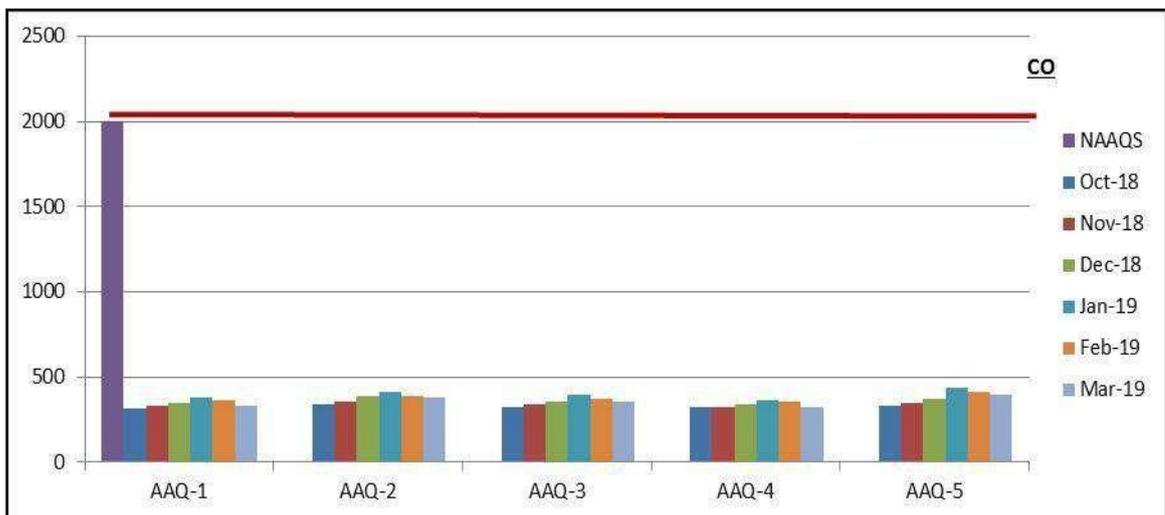
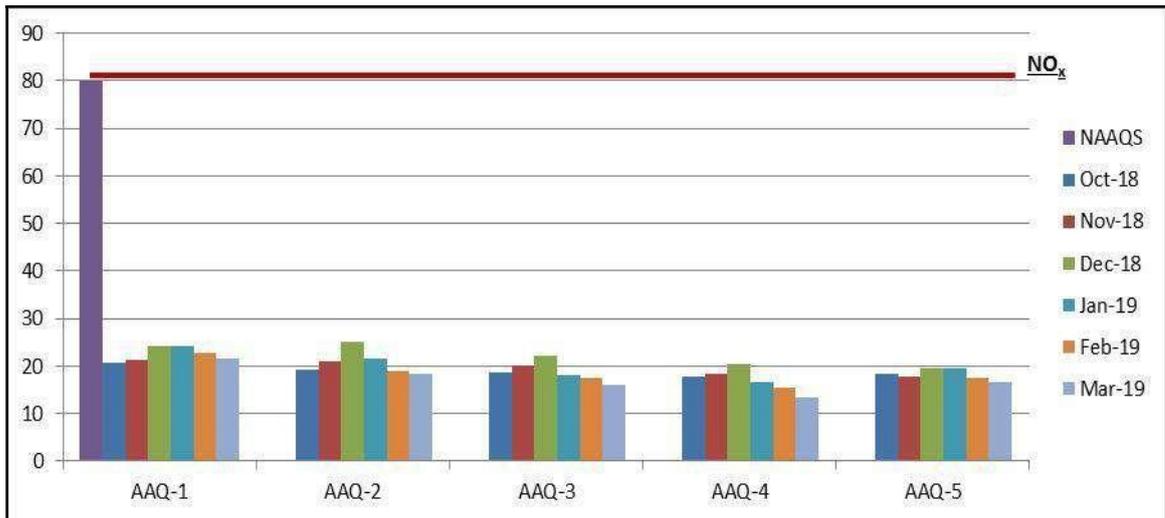
**TABLE – 2.6: Carbon Monoxide (CO)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	316	330	348	381	365	334	316	381	346	379
AAQ-2	Lease Boundary towards North Direction	344	359	391	416	392	379	344	416	380	414
AAQ-3	Lease Boundary towards East Direction	324	338	354	394	371	355	324	394	356	392
AAQ-4	Lease Boundary towards South Direction	321	328	343	368	354	326	321	368	340	367
AAQ-5	Lease Boundary towards South-East	330	346	371	435	412	394	330	435	381	433

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

**Figure – 2.1: GRAPHICAL PRESENTATION (Parameter-wise)**





### 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).

## 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-2018 to March-2019 are given below in **Table-2.7 & Table-2.8.**

**TABLE – 2.7: NOISE LEVEL (DAY HOURS)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG
NL – 1	Near Mine Office	45.5	44.4	43.1	47.2	48.7	51.5	43.1	51.5	46.7
NL – 2	Lease Boundary towards North Direction	48.7	48.5	47.5	48.4	50.8	53.2	47.5	53.2	49.5
NL – 3	Lease Boundary towards East Direction	46.5	47.3	46.7	47.7	49.1	50.4	46.5	50.4	48.0
NL – 4	Lease Boundary towards South Direction	47.1	45.7	44.3	44.5	46.3	47.9	44.3	47.9	46.0
NL – 5	Lease Boundary towards South - East	46.4	48.1	46.4	45.8	47.4	48.3	45.8	48.3	47.1

**TABLE – 2.8: NOISE LEVEL (NIGHT HOURS)**

Code	Stations	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	MIN	MAX	AVG
NL – 1	Near Mine Office	37.7	35.2	34.8	43.9	44.3	46.8	34.8	46.8	40.5
NL – 2	Lease Boundary towards North Direction	40.1	38.9	38.2	45.6	48.2	50.5	38.2	50.5	43.6
NL – 3	Lease Boundary towards East Direction	37.5	36.7	36.3	44.1	46.4	47.6	36.3	47.6	41.4
NL – 4	Lease Boundary towards South Direction	38.0	37.3	37.4	38.8	40.9	42.3	37.3	42.3	39.1
NL – 5	Lease Boundary towards South - East	37.2	36.9	36.7	42.5	43.7	45.1	36.7	45.1	40.4

## 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.

## 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-2018 to March-2019 for required parameters. Results are presented in **Table – 2.9**.

**TABLE – 2.9: STACK EMISSION ANALYSIS REPORT**

Particulars	Unit	Stack #1						Consent Status
		Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	
Stack Attached with	-	800 TPH Crusher						-
Stack Height	Meter	32.0						-
Stack Diameter	Meter	1.5						-
Ambient Temperature	°C	32.0	31.0	28.0	27.0	30.0	37.0	-
Flue Gas Temperature	°C	48.0	46.0	45.0	45.0	46.0	48.0	-
Velocity	m/s	6.7	6.5	6.3	6.2	6.4	6.9	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	10.5	10.2	9.9	9.7	10.1	10.6	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	25.5	25.9	24.7	25.9	26.6	28.2	< 50.0

## RESULTS & DISCUSSION

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

## WATER (GROUND & SURFACE) QUALITY

### 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.

### 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-2018 to March-2019, are presented below in **Table – 2.11 & Table – 2.12**.

**TABLE – 2.11: GROUND & SURFACE WATER QUALITY REPORT**

Date of Sampling			14.12.2018					
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values			
			Desirable	Permissible	GW-1	GW-2	GW-3	SW-1
<b>A.</b>	<b>ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT</b>							
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	4.3
5.	Total Dissolved Solids	mg/l	500	2000	486.0	542.0	496.0	368.0
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.23	7.24	7.28	7.89
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.7	3.8	3.8	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	20.0
10.	Conductivity	µS/cm	-	-	726.0	818.0	750.0	582.0
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	178.0	212.0	182.0	158.0
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	234.0	228.0	216.0	152.0
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	60.8	59.3	56.2	39.5
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	19.7	19.2	18.1	12.8
15.	Chlorides as Cl	mg/l	250	1000	64.0	71.0	68.0	44.0
16.	Sulphates as SO <sub>4</sub>	mg/l	200	400	49.7	54.3	55.7	19.8

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	0.45	0.58	0.61	0.06
18.	Nitrates as NO <sub>3</sub>	mg/l	45	NR	6.4	8.1	9.8	3.7
19.	Iron as Fe	mg/l	0.3	NR	0.09	0.16	0.19	0.03
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	149
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	21
<b>B.</b>	<b>TOXIC SUBSTANCES</b>							
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			09.03.2019					
Sr. No.	Parameters	Unit	As per IS 10500:2012		Values			
			Desirable	Permissible	GW-1	GW-2	GW-3	SW-1
<b>A.</b>	<b>ITEMS RELATING TO PRESERVATION OF LIVING ENVIRONMENT</b>							
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	532	486	431
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	8	8	12
10.	Conductivity	µS/cm	-	-	756	808	738	663
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	186	204	182	188
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	222	234	208	168
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	57.7	60.8	54.1	43.7
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	18.6	19.7	17.5	14.1
15.	Chlorides as Cl	mg/l	250	1000	73	69	67	59
16.	Sulphates as SO <sub>4</sub>	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 <sub>3</sub>	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	70
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	11
<b>B.</b>	<b>TOXIC SUBSTANCES</b>							
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.

## SOIL QUALITY

### GENERAL

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

### 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

### OBSERVATIONS

The physico-chemical characteristics of soil sample for the period October-2018 to March-2019 have reported in **Table– 2.14 & Table– 2.15**.

**TABLE – 2.14: SOIL QUALITY REPORT**

Date of Sampling		14.12.2018			
Sr. No.	Parameters	Unit	S-1	S-2	S-3
<b>A.</b>	<b>Physical Properties</b>				
1.	Bulk Density	g/cc	1.31	1.29	1.25
2.	Particle Size Distribution	% Gravel	7.5	8.8	4.1
		% Sand	36.4	35.7	32.5
		% Silt	30.8	31.1	29.7
		% Clay	25.3	24.4	33.7

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	39.5	42.7
5.	Water Holding Capacity	%	32.8	32.1	35.9
<b>B.</b>	<b>Chemical Properties</b>				
1.	pH at 25 °C	-	7.11	7.08	6.88
2.	Electrical Conductivity	mmhos/cm	0.147	0.151	0.183
3.	Organic Carbon	%	0.39	0.41	0.82
4.	Cation Exchange Capacity	meq/100 gm	27.2	28.5	32.6
5.	Exchangeable Calcium as Ca <sup>++</sup>	mg/kg	47.9	48.4	58.5
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	11.6	12.9	20.3
7.	Chlorides as Cl	mg/kg	91.5	89.3	90.4
8.	Sulphate as SO <sub>4</sub>	mg/kg	93.2	91.1	108.5
9.	Nitrogen as N	kg/ha	82.6	87.5	395.2
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	67.4	69.8	109.1
11.	Potassium as K <sub>2</sub> O	kg/ha	84.8	85.2	289.4

**TABLE – 2.15: SOIL QUALITY REPORT**

Date of Sampling		09.03.2018			
Sr. No.	Parameters	Unit	S-1	S-2	S-3
<b>A.</b>	<b>Physical Properties</b>				
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>B.</b>	<b>Chemical Properties</b>				
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 <sup>++</sup>	mg/kg	46.4	47.1	57.3
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	11.2	12.5	19.8
7.	Chlorides as Cl	mg/kg	91.1	89.8	84.6
8.	Sulphate as SO <sub>4</sub>	mg/kg	93.8	96.2	109.5
9.	Nitrogen as N	kg/ha	73.6	75.1	329.3
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	67.5	69.3	102.6
11.	Potassium as K <sub>2</sub> O	kg/ha	74.7	72.9	278.2

## 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

## 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 1.31, 1.29 & 1.25 and 1.34, 1.33 & 1.22 g/cm<sup>3</sup> respectively.
- (b) All soil samples have 7.11, 7.08 & 6.88 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** 0.147, 0.151 & 0.183 and 0.152, 0.157 & 0.188 mmhos/cm respectively.
- (d) All soil samples have **Organic Carbon** 0.39, 0.41 & 0.82 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 82.6, 87.5 & 395.2 and 73.6, 75.1 & 329.3.7 kg/ha respectively.
- (f) All soil samples have also sufficient concentration of **Available Phosphorous** as its values are 67.4, 69.8 & 109.1 and 67.5, 69.3 & 102.6 kg/ha respectively.
- (g) All soil samples have less concentration of **Available Potassium** as its values are 84.8, 85.2 & 289.4 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---