

**Addl. Principal Chief Conservator of Forest**  
Ministry of Environment Forest and 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: MoEF & CC Clearance letter no. J-11011/1170/2007-IA II(I) 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 Environment Clearance given by MoEF & CC vide its letter no. J-11011/1170/2007-IA II (I) Dated 13.05. 2009, we are hereby submitting half yearly compliance report for our Integrated Cement Plant (Clinker 1.98 MTPA, Cement 5 MTPA), Limestone Mines (Limestone production capacity 4.8 MTPA from 267.695 ha & 252.105 ha) and Captive Thermal Power Plant (40 MW) and Waste Heat Recovery Based Power Plant – 08 MW, located at village- Malpuri Khurd, Khasadih, Semariya, Ghikuriya and Nandini Kundini, Tehsil- Dhamdha, District Durg, C.G. for the period of **October 2019 – March 2020**.

It may be noted that we are forwarding, half yearly compliance report with annexures through 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.



**Dr. Satish Mishra**  
**GM (Env. & Safety)**

Encl: As above

- CC: 1. Regional Officer- Chhattisgarh Environment Conservation Board , 5/32 Bunglow Bhilai, Dist.- Durg. (CG)**  
**2. Zonal Officer- Central Pollution Control Board- Parivesh Bhawan E-5 Paryavan Parisar Area Colony Bhopal- 462016**

**ENVIRONMENTAL CLEARANCE COMPLIANCES AS STIPULATED IN ENVIRONMENTAL CLEARANCE  
AND THEIR SUBSEQUENT AMENDMENTS, FOR  
JK LAKSHMI CEMENT LTD., INTEGRATED CEMENT PLANT AND LIMESTONE MINES**

MOEF (I.A. Division) granted EC vide F. No. J-11011/1170/2007-IA II (I) for Integrated Cement Plant (Clinker, 3.0 MTPA, Cement 10.0 MTPA), Limestone mine (4.8 MTPA, 267.695 ha and 281.339 ha) and Captive Power Plant (40 MW) dated 13<sup>th</sup> May 2009,

Subsequently MOEF & CC has given extension of validity of Environmental clearance vide F. No. J-11011/1170/2007-IA II (I), which was obtained for completion of balance works of phase-I dated 4<sup>th</sup> September, 2015.

- EC Amendment was made by MOEF vide F. No. J-11011/1170/2007-IA II (I) regarding change of plant location dated 27<sup>th</sup> February, 2010.
- EC Amendment was made by MOEF & CC vide F. No. J-11011/1170/2007-IA II (I) regarding change of mode of limestone transport dated 23<sup>rd</sup> July, 2015.
- EC Amendment was made by MOEF & CC vide F. No. J-11011/1170/2007-IA II (I) regarding opening of second pit in the ML area of project dated 07<sup>th</sup> June, 2017. However, there were no conditions specified in this amendment.
- EC Amendment was made by MOEF & CC vide F. No. J-11011/1170/2007-IA II (I) regarding reduction of mining lease area from 281.339 ha to 252.105 ha and interception of ground water table during mining operation dated 20<sup>th</sup> July, 2018.
- EC Amendment was made by MOEF & CC vide F. No. J-11011/1170/2007-IA II (I) regarding change in configuration of Clinker production of 1.5 MTPA to 1.98 MTPA through Up-gradation and Optimization in Phase-I under the provisions of EIA Notification, 2006. Dated 14<sup>th</sup> November 2018

**COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE OBTAINED FROM MOEF (I.A. DIVISION) VIDE F. NO. J-11011/1170/2007-IA II (I) FOR INTEGRATED CEMENT PLANT (CLINKER, 3.0 MTPA, CEMENT 10.0 MTPA), LIMESTONE MINE (4.8 MTPA, 267.695 HA AND 281.339 HA) AND CAPTIVE POWER PLANT (40 MW) DATED 13<sup>TH</sup> MAY 2009, SUBSEQUENTLY MOEF & CC HAS GIVEN EXTENSION OF VALIDITY OF ENVIRONMENTAL CLEARANCE VIDE F. NO. J-11011/1170/2007-IA II (I), WHICH WAS OBTAINED FOR COMPLETION OF BALANCE WORKS OF PHASE-I DATED 4<sup>TH</sup> SEPTEMBER, 2015.**

<b>A. Specific Conditions</b>		
<b>Sr. No.</b>	<b>CONDITIONS</b>	<b>COMPLIANCE STATUS</b>
i.	<p>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.</p>	<ul style="list-style-type: none"> <li>• <b>Complied</b></li> <li>• We have installed Continuous Emission monitoring System (CEMS) for monitoring of SO<sub>x</sub> &amp; NO<sub>x</sub> parameters which are placed at RABH stack and CPP 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>• Details of the same are in Annexure- i</li> <li>• The emission of SPM is maintained within 30 mg/Nm<sup>3</sup> (As per its CTO), as the Project Proponent has installed state of art, Air Pollution Controlling Equipment's at all stages with adequate capacities.</li> </ul>
ii.	<p>High efficiency electrostatic precipitators (ESPs) to clinker cooler and AFBC boiler (CPP);</p> <p>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 &lt;50 mg/Nm<sup>3</sup>.</p> <p>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>.</p>	<ul style="list-style-type: none"> <li>• <b>Complied</b></li> <li>• High efficiency Electrostatic precipitator's are installed at Clinker Cooler and AFBC boiler (CPP). 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>• Details of the same are in Annexure- ii</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 emissions below 30 mg/Nm<sup>3</sup> (As per its CTO).</li> </ul>

	<p>All the pollution control equipment 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.</p> <p>Continuous stack monitoring facilities for all the stacks and adequate air pollution control systems shall be providing and data submitted to the Ministry's Regional Office Bhopal half yearly, CPCB and CECB quarterly.</p>	<ul style="list-style-type: none"> <li>• Interlocked systems have been already provided at all major Air pollution controlling equipment's for auto shut down in case of failure of any pollution control equipment's.</li> <li>• Continuous Stack emission monitoring data are being uploaded on the CPCB &amp; CECB server.</li> <li>• Half yearly compliance report are being submitted to MOEFCC regional office Nagpur dated 30<sup>th</sup> November 2019 and Quarterly Report submitted to CPCB dated 29<sup>th</sup> January 2020.</li> </ul>
iii.	<p>Ambient air quality monitoring stations shall be set up in the down wind direction as well where maximum ground level concentration of SPM, SO<sub>2</sub> and NO<sub>x</sub> 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.</p>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• To continuously monitor Ambient Air Quality, 06 continuous ambient air monitoring systems have been installed, which includes 04 at plant and 02 at mines premises.</li> <li>• Details of the same are in Annexure- iii</li> <li>• Project proponent has also installed four steel fabricated Environmental Monitoring stations at plant and mines site for regular ambient air Quality monitoring.</li> <li>• Data of ambient air quality monitoring are being displayed at both Plant and Mines main gate and the data is being submitted to the ministry's Regional office at Nagpur half yearly, and to CPCB and CECB quarterly.</li> </ul>
IV.	<p>The fugitive emissions during loading and unloading should be suitably controlled by installing adequate dust collection and extraction system and at all the transfer points. Fugitive emissions shall also be controlled by providing silos and closed roof sheds for raw materials and product. Water sprinkling arrangement shall be made in the raw material stock yard and cement bag loading areas to prevent fugitive emissions. Bag filters shall be provided to coal and limestone handling system. Dust suppression system and water spraying shall be provided</p>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Efficient dust collection and extraction systems (Bag filters) have been installed at all loading, unloading and at all transfer points.</li> <li>• All the conveyer belts carrying the material are fully covered.</li> <li>• All the raw materials including lime Stone, Coal, Slag &amp; Gypsum etc. are being stored in the closed sheds.</li> <li>• Details of the same are in Annexure- IV</li> <li>• Silos are provided for storage of Clinker, Raw meal, and Cement.</li> <li>• Efficient Bag Filters are provided at Coal and</li> </ul>

	in the mine area to control fugitive emissions due to drilling and handling and transportation of general public.	<p><b>Lime stone handling systems.</b></p> <ul style="list-style-type: none"> <li>• <b>Dust Suppression and water sprinkling, systems have been provided at mines area.</b></li> <li>• <b>Wet drilling method is being imparted to control the dust emission during drilling.</b></li> </ul>
v.	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 prominently outside the premises at the appropriate place for the information of general public	<ul style="list-style-type: none"> <li>• <b>Complied</b></li> <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>Details of the same are in Annexure- V</b></li> <li>• <b>Continuous online ambient air quality monitoring and Continuous stack emission 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.</b></li> <li>• <b>Links for the same are</b>  <a href="http://adagecpcb.glensserver.com/">http://adagecpcb.glensserver.com/</a>  <a href="http://cecb.glensserver.com/">http://cecb.glensserver.com/</a>  <a href="http://www.envsaindia.com/cpcb/login.php">www.envsaindia.com/cpcb/login.php</a> </li> </ul>
vi.	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>• <b>Complied</b></li> <li>• <b>All necessary measures have been taken to control the Secondary fugitive emissions. Project proponent has Truck mounted sweeping/vacuum cleaning machine along with mechanical road sweeping machine. We have also developed Greenbelt along the length of road to arrest fugitive dust emissions. These fugitive emissions are kept within the permissible limits as set by the ministry and are regularly monitored</b></li> <li>• <b>Details of the same are in Annexure- VI</b></li> </ul>
vii.	Asphalting /Concreting of roads and water spray all around the critical areas prone to air pollution and having high levels of SPM and	<ul style="list-style-type: none"> <li>• <b>Complied</b></li> <li>• <b>The plant and mines area have concrete road for road transportation, We also have 2 road sweeping and cleaning machines to arrest any kind of emissions and 2 water tankers have been engaged for dust suppression purposes</b></li> </ul>

	RPM shall be ensured	<p>at Mine haul roads.</p> <ul style="list-style-type: none"> <li>• Details of the same are in Annexure- VII</li> </ul>
viii.	No new pit shall be opened till old pit is exhausted	<ul style="list-style-type: none"> <li>• 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 to facilitate use of low grade limestone(Mineral Conservation) for blending with high grade limestone to optimize life of mine.</li> </ul>
ix.	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>• 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 conveyor is already completed necessary material have been procured from Bridgestone, Japan. However EC amendment was obtained by project proponent 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 major raw materials are being transported through tarpaulin covered trucks (containers) and bulkers whose weightment is done.</li> <li>• Only valid pollution under control vehicles are allowed inside the plant.</li> <li>• Details of the same are in Annexure- VIII</li> <li>• Detail showing the progress of the pipe conveyor is attached as Annexure.</li> </ul>
x.	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 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	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Our total water requirement from Shivnath river and bore wells does not exceed 4500 m<sup>3</sup>/day.</li> <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. Project proponent is maintaining "Zero discharge" which is being and will be strictly followed.</li> <li>• Details of the same are in Annexure- IX</li> <li>• Permission for Interception of ground water table during mining operation has already been obtained by EC amendment from the MOEF &amp; CC vide letter no J-11011/1770/2007-IA II (I), Dated 20th July 2018 and this condition got amended to "Mining shall</li> </ul>

	green belt development.	<p>intercept the ground water table”</p> <ul style="list-style-type: none"> <li>• Root zone technology based Sewage Treatment plant with a capacity of 70 m<sup>3</sup>/day is under operation and treated water is being utilized for Dust suppression and green belt development.</li> </ul>
XI.	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.	<p>Complied</p> <p>Project proponent consented to condition.</p> <ul style="list-style-type: none"> <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 September 2012.</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>
XII.	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>• Complied</li> <li>• Detailed hydrological study has been carried out and statuses of compliances / recommendations are being regularly submitted to the CGWA dated 4<sup>th</sup> July 2019. Based on recommendations, we have built a total of 53 rain water harvesting structures, 2 conservation ponds within plant premises and 6 rain water harvesting structures in nearby villages, to recharge 1659782 m<sup>3</sup>/Year</li> </ul>
XIII.	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>• Complied</li> <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. Their entire process is a closed system and we do not generate any kind of process waste.</li> <li>• Their STP is based on Root zone Technology and sludge acts as manure to plants.</li> <li>• Waste oil is being sold to authorized recyclers only</li> </ul>
XIV.	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</li> </ul>

<p><b>XV.</b></p>	<p>Effort shall be made to use low grade lime, more fly ash and solid waste in the cement manufacturing.</p>	<ul style="list-style-type: none"> <li>• To facilitate use of low grade limestone (mineral conservation) for blending with high grade limestone to optimize life of mine, we have obtained amendment in their EC no. J-11011/1170/2007-IA.II(I) dated 13.05.2009</li> </ul>
<p><b>XVI.</b></p>	<p>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.</p>	<ul style="list-style-type: none"> <li>• Noted and agreed</li> <li>• vide letter No. JKLC/Durg/Env/1109 dated 12.12.2011.</li> </ul>
<p><b>XVII.</b></p>	<p>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)</p>	<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 from CPP (20 MW) is being used within the plant for manufacturing of cement.</li> </ul>
<p><b>XVIII.</b></p>	<p>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</p>	<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>• Four water tankers have been engaged for watering of these plants.</li> <li>• So far the company has planted about 163599 saplings which includes 92913 plants in mines area and 70686 plants in Factory area.</li> <li>• Project proponent has developed in-house nurseries where about 21000 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>• Details of the same are in Annexure- X</li> </ul>
<p><b>XIX.</b></p>	<p>Wet drilling blasting method and provision for the control air emissions during blasting using dust collectors etc. shall be used.</p>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Wet drilling method is being used to control the dust emission from mines.</li> <li>• Details of the same are in Annexure- XI</li> </ul>



XX.	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>• <b>Noted and being complied</b></li> </ul>
XXI.	The company shall obtain 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>• <b>Noted and complied</b></li> </ul>
XXII.	All the safety norms stipulated by the Director General, Mines and Safety (DGMS) shall be implemented.	<ul style="list-style-type: none"> <li>• <b>All necessary safety norms stipulated by the DGMS are being followed. We provide all the required Personal Protective Equipment's (PPEs) are being provided to the employees and workers.</b></li> </ul>
XXIII	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>• <b>R &amp; R is not applicable to us.</b></li> </ul>
XXIV	All the recommendation mentioned in the Corporate Responsibility for Environment Protection (CREP) guidelines shall be followed implemented	<ul style="list-style-type: none"> <li>• <b>Noted and agreed</b></li> <li>• <b>Details of the same are in Annexure- XII</b></li> </ul>
XXV.	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	<ul style="list-style-type: none"> <li>• <b>The company had provided temporary housing for labor within site during project phase.</b></li> <li>• <b>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.</b></li> </ul>

	completion of the project	<ul style="list-style-type: none"> <li>• <b>Medical Health care with qualified personnel has been provided.</b></li> </ul>
<b>B.</b>	<b>GENERAL CONDITIONS:</b>	
i.	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>• <b>Noted and agreed.</b></li> </ul>
ii.	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>• <b>Project proponent has obtained EC amendment in vide F. No. J-11011/1170/2007-IA.II(I), for change in configuration of clinker production of 1.5 MTPA to 1.98 MTPA through upgradation and optimization in Phase-I under 7.ii of EIA notification, 2006.</b></li> </ul>
iii.	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>• <b>Complied</b></li> <li>• <b>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.</b></li> <li>• <b>All internal roads / area are built of concrete to control fugitive emissions during road transportation.</b></li> <li>• <b>Water sprinkling is being done all around the coal stockpiles to control fugitive dust emissions.</b></li> <li>• <b>Project Proponent has also provided Road Vacuum sweeper machine, to control fugitive dust emissions.</b></li> </ul>
iv.	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>• <b>We do not generate waste water as the process is based on dry process.</b></li> </ul>
v.	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	<ul style="list-style-type: none"> <li>• <b>Project proponent is taking all the precautionary measures to control the noise pollution and ensure that the noise will be well within specified standards 85 dB(A).</b></li> </ul>

	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>• <b>Regular noise level monitoring is being conducted at plant site and mines area.</b></li> </ul>
<b>vi.</b>	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>• <b>To harvest rain water, company has constructed 53 rain water harvesting systems with a rain water harvesting potential of 15,83,038 m<sup>3</sup>/year @ rainfall of 960 mm.</b></li> <li>• <b>Details of the same are in Annexure XIII</b></li> </ul>
<b>vii.</b>	All the recommendations of the CREP guidelines shall be strictly followed.	<ul style="list-style-type: none"> <li>• <b>Noted and Agreed</b></li> </ul>
<b>viii.</b>	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 and Agreed</b></li> </ul>
<b>ix.</b>	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> <li>• <b>Details of the same are in Annexure- XIV</b></li> </ul>
<b>x.</b>	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>Project proponent has incurred an expenditure of Rs. 127 Crore for the installation of Air pollution control equipment's which is under operation with the capacity of 1.98 MTPA clinker, 5 MTPA cement production &amp; 10 MW Waste heat recovery based Power Plant and 3.5 MTPA Limestone mine from ML-1 and ML-2.</b></li> <li>• <b>For the socio economic development project proponent has 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>
<b>xi.</b>	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	<ul style="list-style-type: none"> <li>• <b>Half Yearly Environment Compliance report being regularly submitted to Regional Offices of CPCB dated 4<sup>th</sup> December 2019, MoEF &amp; CC (Nagpur) dated 30<sup>th</sup> November 2019 and CECB</b></li> </ul>

	interpretation shall be submitted to them regularly.	<b>(Bhilai) dated 4<sup>th</sup> December 2019.</b>
<b>XII.</b>	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>
<b>XIII.</b>	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>Project proponent has 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>

**COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE AMENDMENT OBTAINED FROM MOEF (I.A. Division) vide F. No. J-11011/1170/2007-IA II (I) regarding change of plant location dated 27<sup>th</sup> February, 2010.**

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

S. No.	CONDITION	COMPLIANCE STATUS
i.	<p>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.</p>	<p><b>Complied</b>  <b>Project proponent consented to condition.</b></p> <ul style="list-style-type: none"> <li>• <b>Project proponent is doing its CSR activity for the socio-economic development of nearby 07 Villages. Comprehensive details of CSR and item wise details have already been prepared and submitted to the MOEF &amp; CC New Delhi vide our letter no B-11011/3/2008-M-MP dated 15.02.2010.</b></li> <li>• <b>Details of the same are in Annexure- XIV</b></li> </ul>
ii.	<p>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.</p>	<ul style="list-style-type: none"> <li>• <b>Complied</b></li> <li>• <b>Being followed by taking all measures to keep their surrounding ambient air quality as per NAAQs standards.</b></li> </ul>
iii.	<p>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.</p>	<ul style="list-style-type: none"> <li>• <b>Noted and Agreed.</b></li> </ul>
iv.	<p>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,</p>	<ul style="list-style-type: none"> <li>• <b>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 dated 30<sup>th</sup> November 2019, CPCB Zonal office Bhopal 30<sup>th</sup> November 2019 and Regional office CECB Raipur dated 4<sup>th</sup> December 2019.</b></li> <li>• <b>Environmental monitoring data is being</b></li> </ul>

	indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	<b>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 as an annexure to EC compliance.</b>
v.	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.	<b>Complied</b> <b>Project proponent consented to condition.</b> <ul style="list-style-type: none"> <li>• <b>Half yearly Monitoring report and results of monitoring data (both in hard copies as well as by e-mail) are being submitted to the Regional Office of MOEF, the respective Zonal Office of CPCB and SPCB. For the period of October 19 to March 20 was submitted on 30<sup>th</sup> April 2020.</b></li> </ul>
vi.	The Environmental statement for each financial year ending 31 <sup>st</sup> March in Form –V as it mandated to be submitted by the project proponent to the concerned State Pollution Control Board As prescribed under the Environmental (Protection) Rule 1986, as amended subsequently, shall also be put on the web site of the company along with the status of compliance of environmental condition and shall also be sent to the respective Regional Offices of the MOEF by e-mail.	<ul style="list-style-type: none"> <li>• <b>Environment statement for last year was submitted on 26.09.2019</b></li> </ul>
vii.	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.	<b>Noted and complied</b>

**COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE AMENDMENT  
OBTAINED FROM MOEF & CC (I.A. DIVISION) VIDE F. NO. J-11011/1170/2007-IA II (I) REGARDING  
CHANGE OF MODE OF LIMESTONE TRANSPORT DATED 23<sup>rd</sup> JULY, 2015.  
(Ref: EC Amendment Dated 27<sup>th</sup> February 2010)**

**Additional Specific Condition**

<b>S No.</b>	<b>CONDITION</b>	<b>COMPLIANCE STATUS</b>
i.	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.	<p><b>Complied</b></p> <ul style="list-style-type: none"> <li>• Limestone is being transported in duly-covered vehicles with tarpaulin to avoid fugitive dust emission during transportation. Facilities for parking of trucks carrying limestone has also been created within the plant site.</li> </ul>
ii.	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.	<p><b>Complied</b></p> <ul style="list-style-type: none"> <li>• 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>.</li> <li>• Dust suppression system (water Sprinkler) is provided at Limes stone unloading point.</li> <li>• Project proponent has raised Green belt along the length of limestone transportation route to control vehicular emissions.</li> <li>• Dust suppression system being installed at all loading unloading points of lime stone stacker area.</li> <li>• 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.</li> </ul>
iii.	All approach roads shall be black topped and the eternal roads shall be connected. The roads shall be regularly cleaned with mechanical sweepers.	<p><b>Complied</b></p> <ul style="list-style-type: none"> <li>• All internal roads are pucca - Concrete and the roads are being regularly cleaned with mechanical sweepers.</li> </ul>

**COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE AMENDMENT OBTAINED FROM MOEF & CC (IMPACT ASSESSMENT DIVISION) VIDE F. NO. J-11011/1170/2007-IA II (I) REGARDING REDUCTION OF MINING LEASE AREA FROM 281.339 HA TO 252.105 HA AND INTERCEPTION OF GROUND WATER TABLE DURING MINING OPERATION DATED 20<sup>TH</sup> JULY, 2018.**

**(Ref: EC Amendment Dated 20<sup>th</sup> JULY 2018)**

S No.	CONDITION	COMPLIANCE STATUS
i.	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 and agreed</b></li> </ul>
ii.	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 and agreed</b></li> </ul>
iii.	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 Piezometers have been installed at plant site and 04 at Mines area. The reports are being submitted to the regional office of the ministry dated 1<sup>st</sup> June 2019 and CECB every six months dated 6th June 2019.</b></li> <li>• <b>Details of the same are in Annexure- XV</b></li> </ul>
IV.	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.	<p><b>Complied</b></p> <ul style="list-style-type: none"> <li>• <b>Water meters have been installed on all Bore wells for monitoring of ground water withdrawal. Regular monitoring of water consumption on monthly basis is being carried out.</b></li> <li>• <b>Details of the same are in Annexure- XVI</b></li> </ul>



<p>v.</p>	<p>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 .</p>	<p><b>Complied</b></p> <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 In half yearly report.</b></li> <li>• <b>The ground water quality is being monitored during pre-monsoon and post monsoon and record of monitoring data is being maintained and submitted to the regional office of the ministry and CECB in Half yearly reports.</b></li> <li>• <b>Monitoring report is enclosed with this Half yearly EC compliance report.</b></li> </ul>
<p>vi.</p>	<p>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.</p>	<p><b>Complied</b></p> <ul style="list-style-type: none"> <li>• <b>A 3-tier avenue plantation along the roads and along the lease boundary has been done. Local species have been given importance.</b></li> <li>• <b>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.</b></li> </ul>

**COMPLIANCES OF CONDITION STIPULATED IN ENVIRONMENTAL CLEARANCE AMENDMENT  
WAS MADE BY MOEF & CC (IMPACT ASSESSMENT DIVISION) VIDE F. NO. J-11011/1170/2007-IA  
II (I) REGARDING CHANGE IN CONFIGURATION OF CLINKER PRODUCTION OF 1.5 MTPA TO 1.98  
MTPA THROUGH UP-GRADATION AND OPTIMIZATION IN PHASE-I UNDER THE PROVISIONS OF  
EIA NOTIFICATION, 2006. DATED 14<sup>TH</sup> NOVEMBER 2018**

(Ref: EC amendment dated 14 th November, 2018)

Sr No.	CONDITION	COMPLIANCE STATUS
i.	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.	<p><b>Complied</b> Project proponent consented to condition. Details of the same are in Annexure- XVII</p>
ii.	The air pollution control devices should be upgraded to meet the requirement of additional pollution load and shall meet the standards.	<p><b>Complied</b> Project proponent consented to condition.</p> <ul style="list-style-type: none"> <li>• State of Art Air Pollution Control Equipments have already been installed which have been upgraded by activation of standby chambers/Fields to meet additional pollution load thereby meeting the standards as prescribed.</li> <li>• To control NOx emissions project proponent has installed Selective Non Catalytic Reduction (SNCR) at Integrated Cement plant.</li> <li>• To control SOx emissions the project proponent has also installed Flue Gas Desulfurization at Captive Power plant.</li> </ul>
iii.	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, agreed and complied</b></li> </ul>

## **CEMS and Opacity Meter installed at All major Stacks in Plant**



*RABH CEMS and Opacity Meter installed at CPP stack and Server Room*



*CPP CEMS and Opacity Meter installed at CPP stack and Server Room*



***Cement mill- 1 Opacity Meter***



***Cement Mill-2 Opacity meter***



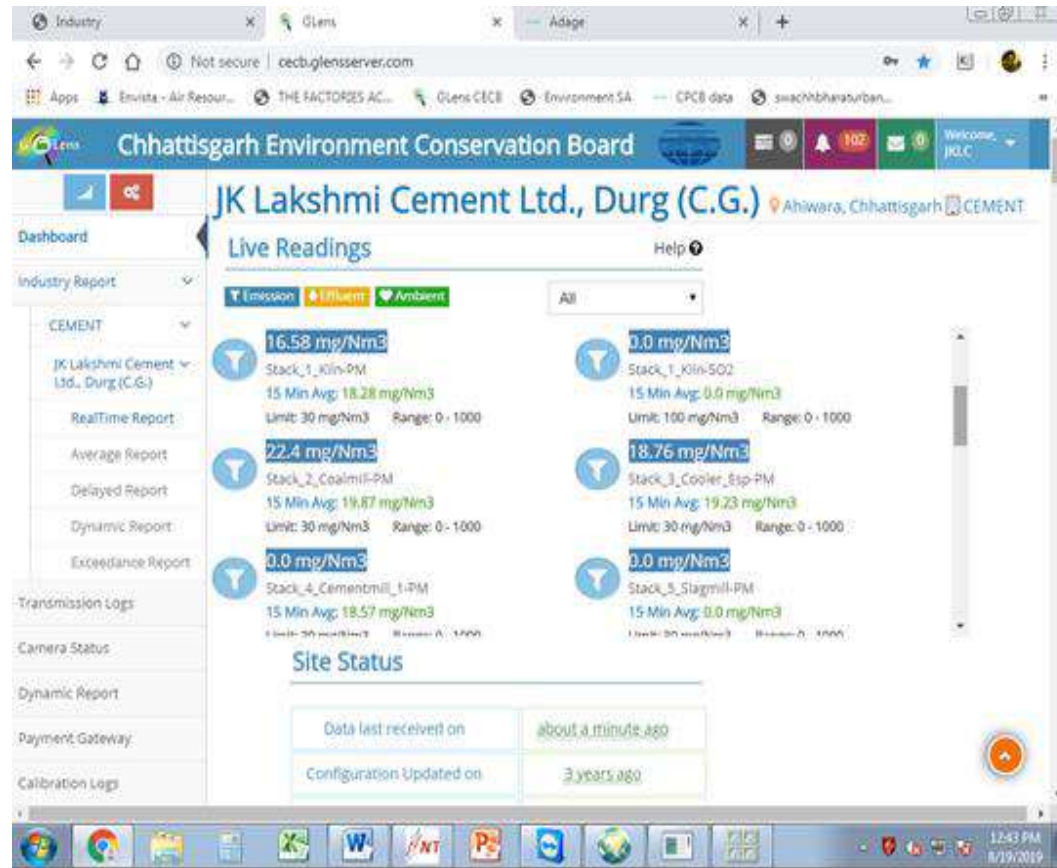
***RABH Opacity meter***



***Slag mill Opacity Meter***



***Coal Mill Opacity Meter***



*A snap of data transmission*

### ESP connected to Clinker Cooler



SL. No.	Clinker Cooler ESP Details	
1	Volume Flow	699720 m <sup>3</sup> /h
2	Gas temperature	343.00 0C
3	Pressure	-133
4	Precipitator Current	800 mA
5	Gas Density	0.542 kg/m <sup>3</sup>
6	Dust Emission designed for	<30 mg/Nm <sup>3</sup>

### ESP connected to AFBC Boiler



SL. No.	AFBC Boiler ESP Details	
1	Volume Flow	699720 m <sup>3</sup> /h
2	Gas temperature	343.00 0C
3	Pressure	-133
4	Precipitator Current	800 mA

5	Gas Density	0.542 kg/m <sup>3</sup>
6	Dust Emission designed for	<30 mg/Nm <sup>3</sup>

### Reverse Air Bag House



Sr. No	Bag Filter Location	Main RABH
1	Equipment Code	421 BH1
2	No of bags	3648
3	Design Temp	260
4	Bag Type	Woven Fibber Glass with PTFE Membrane
5	Design Volume of bag filter M <sup>3</sup> /hr	893380
6	Diameter (m)	0.292
7	Length (m)	9.347
8	Filtering Area (M <sup>2</sup> )	8.64
9	Air to Cloth Ratio	0.47
10	Dust Emission (mg/Nm <sup>3</sup> )	<50

## Slag Mill Bag house



Sr. No	Bag Filter Location	Slag mill Baghouse
1	Equipment Code	532 BF2
2	No of bags	3200
3	Design Temp	120
4	Bag Type	Polyester Needle Felt
5	Design Volume of bag filter M <sup>3</sup> /hr	513000
6	Diameter (m)	0.127
7	Length (m)	3.35
8	Filtering Area (M <sup>2</sup> )	1.35
9	Air to Cloth Ratio	0.20
10	Dust Emission (mg/Nm <sup>3</sup> )	<50



## Coal Mill Baghouse



Sr. No	Bag Filter Location	Coal Mill Bag house
1	Equipment Code	481 BF1
2	No of bags	1792
3	Design Temp	80
4	Bag Type	Poly Acrylo nitrile needle
5	Design Volume of bag filter M <sup>3</sup> /hr	220000
6	Diameter (m)	0.152
7	Length (m)	3
8	Filtering Area (M <sup>2</sup> )	1.45
9	Air to Cloth Ratio	1.41
10	Dust Emission (mg/Nm <sup>3</sup> )	<50





### Details of Bag filters Installed at Raw Mill Silo (Storage Silo)

Sr. No	Bag Filter Location	Raw Mill Silo			
		Silo Feed Air Slide	For Kiln Dust Bin System	Silo Feed Air Slide	Silo Feed Air Slide
1	Equipment Code	391 BF1	391 BF2	391 BF3	391 BF4
2	No of bags	90	60	42	42
3	Design Temp	45	45	45	45
4	Bag Type	Polyster Needle Felt	Polyster Needle Felt	Polyster Needle Felt	Polyster Needle Felt
5	Design Volume of bag filter M <sup>3</sup> /hr	10000	7000	5000	5000
6	Diameter (m)	0.127	0.127	0.127	0.127
7	Length (m)	3.35	3.35	3.35	3.35
8	Filtering Area (M <sup>2</sup> )	1.35	1.35	1.35	1.35
9	Air to Cloth Ratio	1.37	1.44	1.47	1.47
10	Dust Emission (mg/Nm <sup>3</sup> )	<50	<50	<50	<50

## Details of Bag filters Installed at Clinker Silo (Storage Silo)

Sr. No	Bag Filter Location	Clinker Silo Top			
		For Clinker Silo Top	For Clinker Silo Extraction	For Clinker Silo Extraction	For Clinker Silo Extraction
1	Equipment Code	451 BF2	711 BF1	711 BF2	711 BF3
2	No of bags	256	120	120	120
3	Design Temp		150	150	150
4	Bag Type	synthetic polyester	Homo Polymer Acrylic	Homo Polymer Acrylic	Homo Polymer Acrylic
5	Design Volume of bag filter M <sup>3</sup> /hr		10000	10000	10000
6	Diameter (m)	0.152	0.152	0.152	0.152
7	Length (m)	3	3	3	3
8	Filtering Area (M <sup>2</sup> )	1.45	1.45	1.45	1.45
9	Air to Cloth Ratio	0.00	0.96	0.96	0.96
10	Dust Emission (mg/Nm <sup>3</sup> )	<50	<50	<50	<50





## Details of Bag filters Installed at Blending Silo (Kiln Feed)

Sr. No	Bag Filter Location	Blending Silo (Raw Mill Feed)				
		PH Top Kiln Feed air Slide	Kiln Feed Silo Top	For Mixing Bin	For SFF	For Kiln Feed Bucket Elevator
1	Equipment Code	411 BF4/351BF410	341 BF1/ 341 BF400	411 BF1/351 BF280	411 BF2/351 BF290	411 BF3 /351BF400
2	No of bags	64	100	64	25	64
3	Design Temp					
4	Bag Type	Synthetic Polyester	Synthetic Polyester	Synthetic Polyester	Synthetic Polyester	Synthetic Polyester
5	Design Volume of bag filter M <sup>3</sup> /hr	5000	8000	4500	2000	5000
6	Diameter (m)	0.152	0.152	0.152	0.152	0.152
7	Length (m)	3	3	3	3	3
8	Filtering Area (M <sup>2</sup> )	1.45	1.45	1.45	1.45	1.45
9	Air to Cloth Ratio	0.90	0.92	0.81	0.92	0.90
10	Dust Emission (mg/Nm <sup>3</sup> )	<50	<50	<50	<50	<50









## Real time Continuous Ambient Air Quality Monitoring Stations

### *In Mines*



## Ambient air quality monitoring stations Within Plant Premises



## Environmental Data Display boards for General public



*Data Display board at Plant Main gate*



*Data Display board at Mines Main gate*

**Closed Storage Sheds and Silo to store Raw materials and Products**



**Slag Storage Shed: 10000 Tonne**



**Limestone Storage Shed: 50000 Tonne**



**Coal Storage Shed: 10000 Tonne**



**Additives Storage Shed: 15000 Tonne**



**Gypsum Storage shed: 5000 Tonne**



**Clinker Silo: 45000 Tonne**



**Raw meal Silo: 15000**



**Cement Silo: 4x5000 Tonne**



**Water Sprinkling at Material Loading, Unloading points and on Mine Haul roads to Control Fugitive Dust Emissions**



## Mining best Practices



All bench edges are being fenced with rope and steel pipes to check fall of men during Blast Hole Drilling and Blast Hole charging operations.



Wet drilling is being practiced regularly to control dust emission.



After drilling all drill holes are being plugged with wooden collar cones.



**As a dust control measures we have installed Bag houses and Water sprinkling system over conveyor belts.**

**Environmental Data Display boards for General public**



*Data Display board at Plant Main gate*



*Data Display board at Mines Main gate*

**Dust Collection and Extraction system**

*Using 2 sweeping machines, out of which one is Truck mounted and the other is mechanical sweeping machine.*



**Truck Mounted Sweeping Machine**



**Mechanical Sweeping Machine**

### Concrete Roads for Raw material Transportation in both Plant and Mines



*Concrete Roads within Plant Premises*



*Concrete roads connecting limestone mine and Plant*

**Covered Trucks engaged in Transportation of Raw material and Products**



*Bulkers used for Transporting Fly ash*



*Tarpaulin covered trucks for transporting Raw materials from Limestone mines*

**Air Cooled Condensers installed at Captive Power Plant and Waste Heat Recovery unit**



*Air Cooled Condensers installed at Captive Power Plant*



*Air Cooled Condenser installed at Waste Heat Recovery*



*Annexure-X*

**Green Belt development at Cement Plant:**

*Total 70,686 plants have been planted in 63.72 Ha, against total factory area of 79.4Ha,*

*This is more than 38%.*



**Plant Premises**

## Greenbelt Development at both Mines:

*Total 92,913 plants have been planted in 81.5 Ha. In this FY. We are planting 20,000 saplings in Mines*



**Mines Premises**

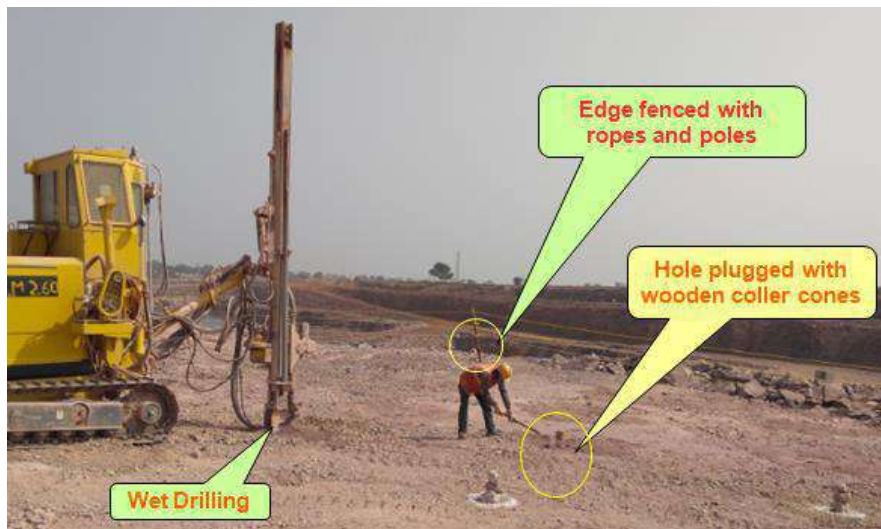
*JKLC In-house Nursery at both Plant and Mines*



## Mining best Practices



All bench edges are being fenced with rope and steel pipes to check fall of men during Blast Hole Drilling and Blast Hole charging operations.



Wet drilling is being practiced regularly to control dust emission.



**After drilling all drill holes are being plugged with wooden collar cones.**



**As a dust control measures we have installed Bag houses and Water sprinkling system over conveyor belts.**



**To control dust generation during hauling regular water sprinkling is being done with water tanker.**

## Implementation Plan of CREP Recommendations

SN.	CREP CONDITION	ACTION PLANNED
1	<p>Cement plant, which are not complying with notified standards, shall do the following to meet the standards:</p> <p>Augmentation of existing Air pollution Control Devices - by July 2003.</p> <p>*No compliance units shall submit bank guarantee equivalent to 10% value of Pollution Control Equipment required.</p>	<p><b>Not Applicable</b></p>
2	<p>Cement plants located in critically polluted or urban areas( including 5 Km distance outside urban boundary) will meet 100 mg/Nm<sup>3</sup> limit of particulate matter by December 2004 and continue working to reduce the emission of particulate matter 50 mg/Nm<sup>3</sup>.</p>	<p><b>Not Applicable</b></p>
3	<p>The new cement kiln to be accorded NOC/ Environmental Clearance w.e.f 1/4/03 will meet the limit of 50 mg/Nm<sup>3</sup> for particulate matter emission.</p>	<ul style="list-style-type: none"> <li>• <b>Efficient bag Filters and All Pollution Control Equipments designed to meet the limit of 50 mg/Nm<sup>3</sup> for particulate matter emission are installed at various dust prone areas.</b></li> </ul>
4	<p>CPCB will evolve load-based standards by December 2003.</p>	<p>-</p>
5	<p>CPCB and NCBM will evolve So<sup>2</sup> and Nox emission standards by June -2004</p>	<p>-</p>
6	<p>The cement industries will control fugitive emission from all raw material and product storage and transfer points by December 2003. However, the National Task Force will decide the feasibility for the control of fugitive emission from limestone and coal storage areas. The NTF shall submit its recommendations within months.</p>	<ul style="list-style-type: none"> <li>• <b>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, and Electrostatic precipitator (ESP) for clinker are installed. Photographs of the same are enclosed as annexure - A</b></li> <li>• <b>Storage shades are constructed for storage of raw materials, silos are constructed for the storage of Clinker, Fly Ash and Cement etc.</b></li> </ul>

7	CPCB, NCBM, BIS and Oil refineries will jointly prepare the policy on use of petroleum coke as fuel in Cement Kiln by July 2003.	<ul style="list-style-type: none"> <li>• <b>Policy is yet to be released.</b></li> </ul>
8	After performance evaluation of various types of continuous monitoring equipment and feedback from the industries and equipment manufacturers, NTF will decide feasible unit operation/section for installation of continuous monitoring equipment. The industry will install the continuous monitoring system (CMS) BY December 2003.	<ul style="list-style-type: none"> <li>• <b>Continuous SPM emission monitors on all major stacks are already installed.</b></li> </ul>
9	Tripping in Kiln to be minimized by July 2003 as per the recommendation on NTF	<ul style="list-style-type: none"> <li>• <b>Not applicable</b></li> </ul>
10	Industries will submit the target date to enhance the utilization of waste material by April 2003.	<p><b>It will be utilized once recently commissioned Cement Plant gets established.</b></p>
11	NCBM will carry out a study on hazardous waste utilization in cement kiln by December 2003.	<ul style="list-style-type: none"> <li>• <b>Noted</b></li> </ul>
12	Cement industries will carry out feasible study and submit target dates to CPCB co-generation of power by July-2003.	<ul style="list-style-type: none"> <li>• <b>Point dropped by the NTF. However JKLCL shall look into the possibility of co-generation of power through waste gases.</b></li> </ul>

### Rain water harvesting structures

Our integrated approach to harvest Rain water, company has constructed 53 rain water harvesting systems with a rain water harvesting potential of 1583038 m<sup>3</sup>/year @ rainfall of 960 mm. Apart from this company has constructed 6 rain water harvesting structures in nearby villages, to recharge Rain water, making a total recharge of 1659782 m<sup>3</sup>/Year.





**CSR Activities undertaken last financial year**

Annexure-XIV

<b>CSR Budget /Expenses for the FY 2019-20</b>					
<b>Area of Operation as per Schedule VII</b>	<b>Sub-Head</b>	<b>Activity</b>	<b>Budget (Lakhs)</b>	<b>Expenses (Lakhs)</b>	<b>Breif Detail</b>
Eradicating Hunger, Poverty and Malnutrition promoting Preventive Health Care & Sanitation and making avaiable Safe Drinking Water	<b>Health Care</b>	Free Health Camp	8.4	8.2	Free health camp at 6 near by village
		Medicines	5.4	4.3	
	<b>Sanitation in Rural Areas</b>	Hygine & Sanitation work at Schools & villages	5.75	5.8	Support to hygine compaigning,Fogging and Awareness program
		Garbage Management at village level	1.4	0.53	Maintance and Diesel & petrol expeses expenses
	<b>Drinking Water</b>	Water huts	0.9	0.76	Drinking Water facility throught Water huts
Promoting Education including special education and employment especially among children, Women, Elderly and the differently abled and Livelihood enhancement projects	<b>Education</b>	Establishment of Community Library at Nandini Khundani	6	7.25	Expenses of Community library with Rent charges
		Coaching Classes for weaker students for exams & compitive exams.	0.96	1.5	Coaching Classes for weaker students & women Elderly and the differently abled

Contd.

Empowerments and livelihood	<b>Livelihood Intervention &amp; Vocational Skills</b>	Vocational training at 7 villages for Youth employability program	<b>2.8</b>	<b>4.3</b>	<b>Honorarium of 6 trainer of tailoring center and rent charges of Khasadih and Semaria center.</b>
		Computer Training (1 Computer Centres )	<b>1.19</b>	<b>1.7</b>	<b>Skill deelopment through Computer training at Near by Village</b>
		SHG Formation for creating Livelihood opportunities	<b>1</b>	<b>0.5</b>	<b>Support to Enterprenurship development</b>
		Entrepreneurship development program group /individual level	<b>1.5</b>	<b>0.25</b>	<b>Summer claesess / Vocational Training</b>
Ensuring environmental sustainability, ecological balance, protection of flora and fauna animal welfare, agroforestry, conversation of natural resources and maintain quality of soil, air and water.	<b>Anilmal Welfare</b>	Veterinary Camps (6 camps )	<b>1.5</b>	<b>2.4</b>	<b>Water Conservation / Harvesting</b>
		Breed upgradation for cattles	<b>1.4</b>	<b>1.3</b>	<b>Shifted to establishment of Digital Learning center at Science Bhavan Durg,</b>
Training to promote rural sports, Nationally recognised Sports, Paralympic Sports Budget	<b>Promoting Rural Sports</b>	Establishment of Sport acadamy & distribution of sports materials	<b>1</b>	<b>0.64</b>	<b>Promoting to Organize Sports and help for procuring Sports and Games Materials</b>
Rural Development Projects	<b>Rural Development</b>	Maintenance of Community Plantation and others activity	<b>4.8</b>	<b>4.76</b>	
<b>Total Expenses</b>			<b>44.00</b>	<b>44.19</b>	

Piezometer installed to measure Ground water Level



Water meters installed to assess Water withdrawal at our Plant & Mines



## Corporate Environment Responsibility

- 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

SL.No	Proposed Activities under CER at nearby villages	Amount to be incurred Rs.	Exp.	Villages for CER activities
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>	

Environment Responsibility (CER ).



# ENVIRONMENTAL STATUS REPORT

(Half-yearly Report for October-2019 to March-2020)

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: [digambar.kale@smsl.co.in](mailto:digambar.kale@smsl.co.in)

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

**MARCH - 2020**

## 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-2019 to March-2020** (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.

Place : **NAGPUR**  
Date : **10.04.2020**

For **MAHARASHTRA ENVIRO POWER LIMITED.**



**Dr. D. G. BATTALWAR**  
Authorized Signatory



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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-2019 to March-2020**.

## 2.0 SUMMARIZED ENVIRONMENTAL BASELINE DATA FOR PERIOD OCTOBER-2019 TO MARCH-2020

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

### 2.1 MICRO-METEOROLOGICAL DATA

#### 2.1.1 OBSERVATION

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

**TABLE – 2.1:**  
**Micro-Meteorological Data for Period October-2019 to March-2019**

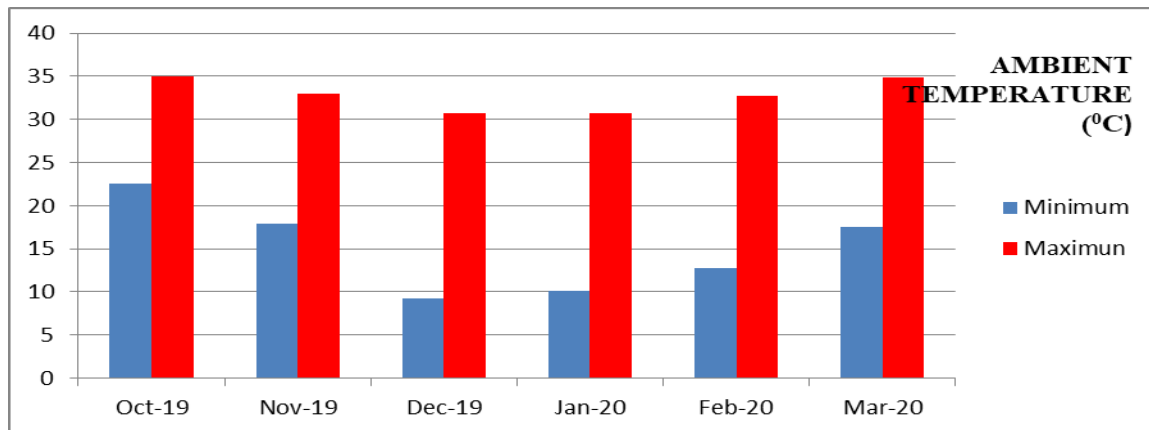
Sr. No.	Months	Minimum	Maximum
<b>WIND SPEED (km/hr)</b>			
1.	October - 2019	0.0	12.8
2.	November - 2019	0.1	11.4
3.	December - 2019	0.0	9.4
4.	January - 2020	0.0	3.3
5.	February - 2020	0.0	4.3
6.	March - 2020	0.0	4.0
<b>AMBIENT TEMPERATURE (°C)</b>			
1.	October - 2019	22.5	35.0
2.	November - 2019	17.9	33.0
3.	December - 2019	9.2	30.7
4.	January - 2020	10.1	30.7
5.	February - 2020	12.8	32.7
6.	March - 2020	17.5	34.9

table contd...

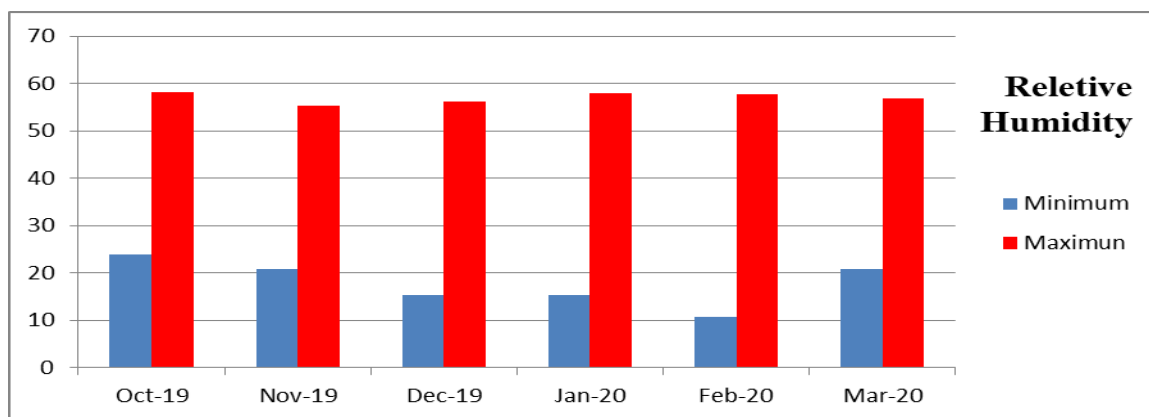
table contd...

<b>RELATIVE HUMIDITY (%)</b>			
1.	October - 2019	23.9	58.2
2.	November - 2019	20.8	55.4
3.	December - 2019	15.4	56.2
4.	January - 2020	15.2	57.9
5.	February - 2020	10.6	57.7
6.	March - 2020	20.8	56.8
<b>ATMOSPHERIC PRESSURE (mm-Hg)</b>			
1.	October - 2019	841.0	861.7
2.	November - 2019	837.9	849.2
3.	December - 2019	833.7	859.2
4.	January - 2020	836.6	865.5
5.	February - 2020	834.1	864.0
6.	March - 2020	838.4	855.4

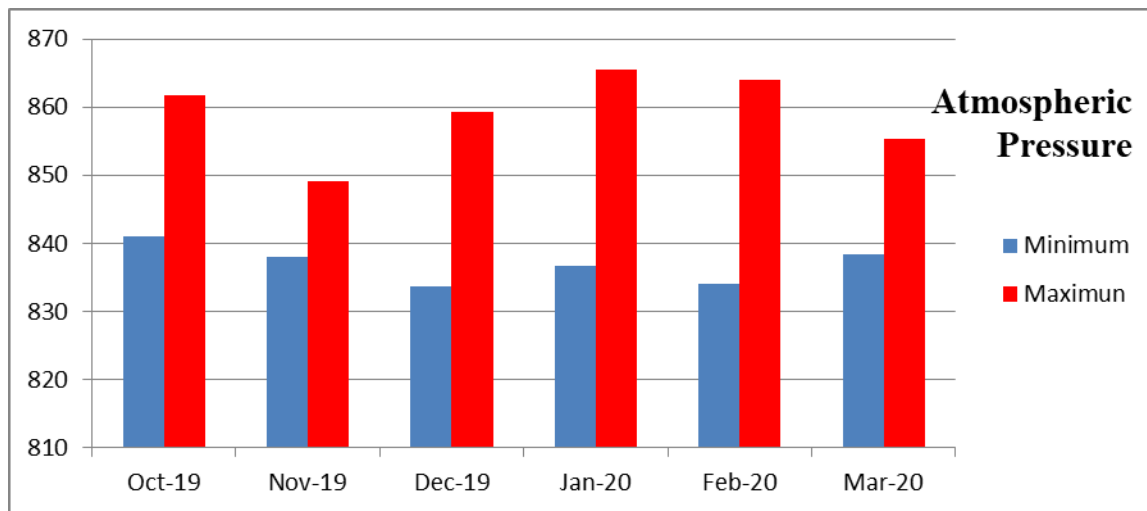
**Graphical Presentation of Ambient Temperature**



**Graphical Presentation of Relative Humidity**



### Graphical Presentation of Atmospheric Pressure



#### 2.1.2 RESULTS AND DISCUSSION

Total **rainfall** for the period October-2019 to March-2020 was 232.5 mm and out of which, 75.0 mm rainfall was found in month October-2019.

Mostly **wind** was found (<12.8 km/hr) and maximum time wind was predominated from East and E-SE direction during period October-2019 to March-2020. Maximum wind speed was observed in month of October-2019 and speed was 12.8 km/hr.

Ambient **temperature** was monitored on hourly basis for minimum & maximum during period October-2019 to March-2020. Observed minimum temperature was 9.2 °C in month December-2019 and maximum temperature was 35.0 °C in month October-2019.

Relative **humidity** was monitored on hourly basis for minimum & maximum during period October-2019 to March-2020. Observed minimum humidity was 10.6 % in months February-2020 and maximum humidity was 58.2% also in month October-2019.

**Atmospheric pressure** was monitored on daily basis during period October-2019 to March-2020. Observed minimum atmospheric pressure was 833.7 mm-Hg in month December -2019 and maximum atmospheric pressure was 865.5 mm-Hg in months January-2020.

## 2.2 AMBIENT AIR QUALITY (AAQ)

Monitored Ambient Air Quality values (parameter-wise) in & around the plant site for the period April-2019 to Septemebr-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-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	53.2	51.2	52.6	60.2	61.4	63.9	51.2	61.4	55.7	61.3
AAQ-2	Boundary towards North-East Direction	53.2	54.1	58.3	61.7	61.2	64.3	53.2	61.7	57.7	61.7
AAQ-3	Boundary towards East Direction	51.1	53.3	52.0	67.9	69.2	70.6	51.1	69.2	58.7	69.1
AAQ-4	Boundary towards North Direction	49.4	50.4	49.9	58.4	62.3	65.4	49.4	62.3	54.1	62.0
AAQ-5	Boundary towards South West Direction	49.3	51.2	46.5	52.3	53.4	54.7	46.5	53.4	50.5	53.3

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	26.9	27.7	28.1	29.4	30.1	31.4	26.9	30.1	28.4	30.0
AAQ-2	Boundary towards North-East Direction	28.6	30.1	30.2	30.9	31.6	32.1	28.6	31.6	30.3	31.5
AAQ-3	Boundary towards East Direction	31.2	31.9	32.4	35.6	36.4	37.2	31.2	36.4	33.5	36.3
AAQ-4	Boundary towards North Direction	29.3	30.5	33.2	28.4	29.7	30.4	28.4	33.2	30.2	33.0
AAQ-5	Boundary towards South West Direction	25.8	26.2	27.6	25.3	26.3	26.9	25.3	27.6	26.2	27.5

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	14.1	14.3	15.3	14.2	14.9	15.2	14.1	15.3	14.6	15.3
AAQ-2	Boundary towards North-East Direction	12.8	13.4	14.1	19.2	20.1	20.7	12.8	20.1	15.9	20.0
AAQ-3	Boundary towards East Direction	11.2	12.6	13.6	16.9	17.5	17.9	11.2	17.5	14.4	17.5
AAQ-4	Boundary towards North Direction	13.2	13.7	14.7	14.5	14.9	15.3	13.2	14.9	14.2	14.9
AAQ-5	Boundary towards South West Direction	12.4	13.2	13.8	17.3	17.9	18.2	12.4	17.9	14.9	17.9

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	20.7	21.4	24.5	20.3	21.4	21.8	20.3	24.5	21.7	24.3
AAQ-2	Boundary towards North-East Direction	19.3	19.7	20.7	24.7	26.4	26.7	19.3	26.4	22.2	26.3
AAQ-3	Boundary towards East Direction	24.8	25.6	26.2	23.5	25.5	25.9	23.5	26.2	25.1	26.2
AAQ-4	Boundary towards North Direction	18.4	19.7	20.4	20.6	21.7	22.3	18.4	21.7	20.2	21.6
AAQ-5	Boundary towards South West Direction	18.3	19.1	20.1	18.7	19.4	20.7	18.3	20.1	19.1	20.0

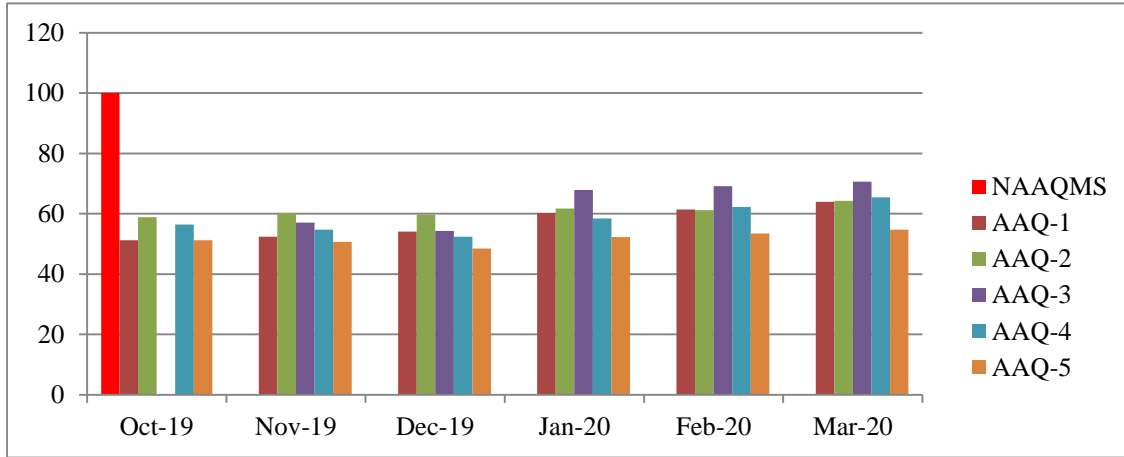
**TABLE – 2.6: Carbon Monoxide (CO)**

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Boundary towards West Direction	432	446	478	342	356	363	342	478	410	475.4
AAQ-2	Boundary towards North-East Direction	452	478	562	358	368	372	358	562	443	555.3
AAQ-3	Boundary towards East Direction	460	476	573	348	354	359	348	573	442	565.2
AAQ-4	Boundary towards North Direction	442	468	557	332	342	362	332	557	428	549.9
AAQ-5	Boundary towards South West Direction	434	448	459	381	385	392	381	459	421	458.1

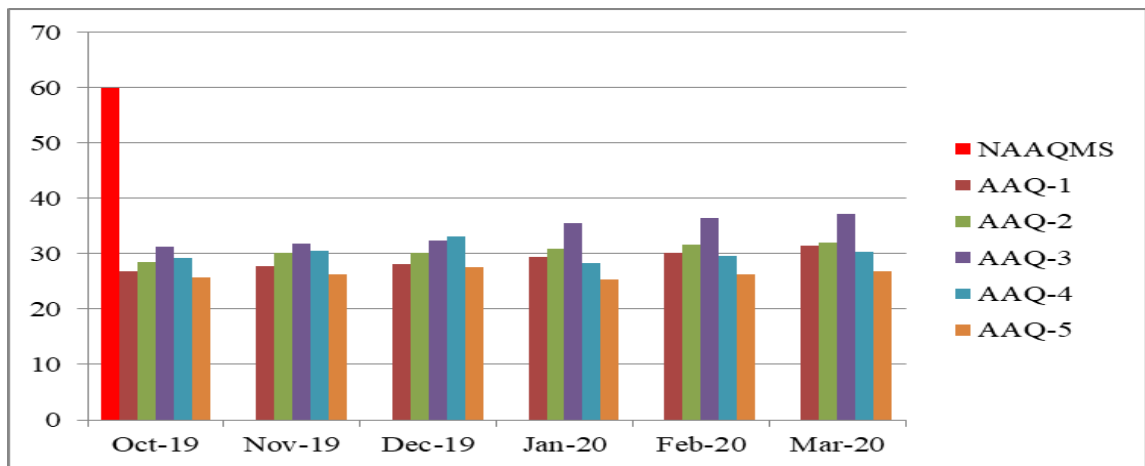
The graphical presentations (parameter-wise) of above observations are presented below in **Figure – 2.1**

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

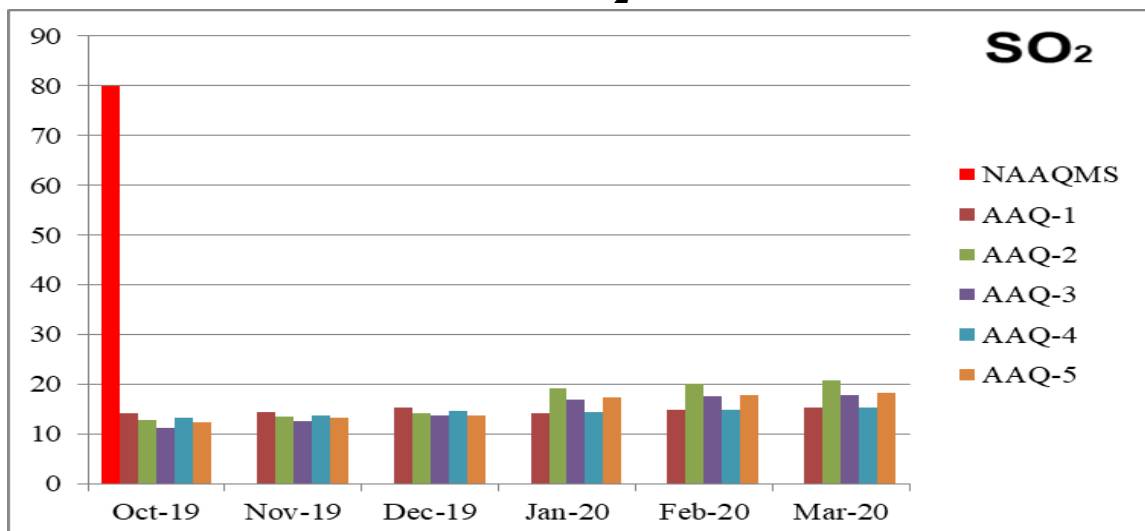
**PM<sub>10</sub>**



**PM<sub>2.5</sub>**

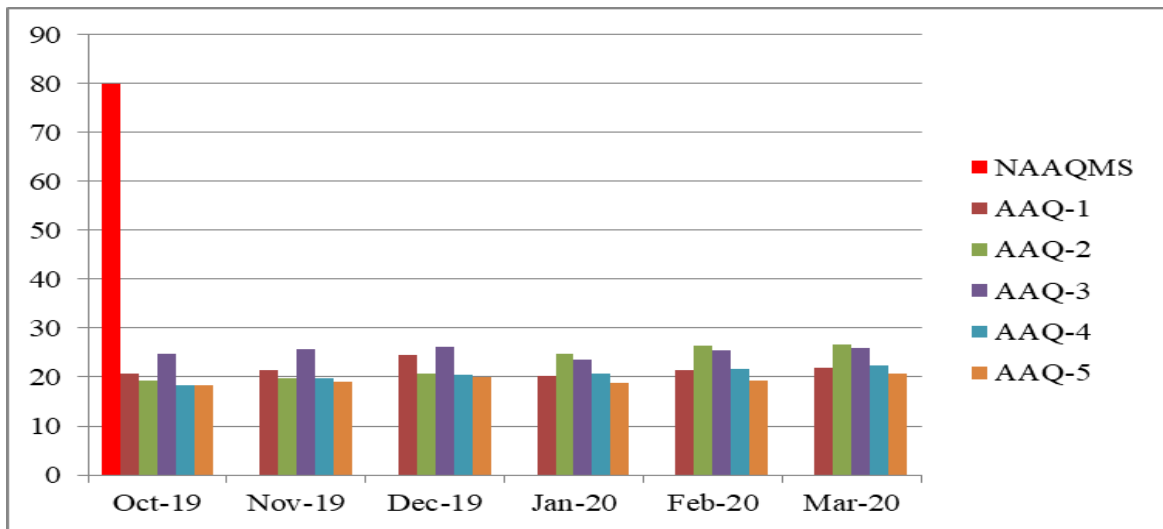


**SO<sub>2</sub>**

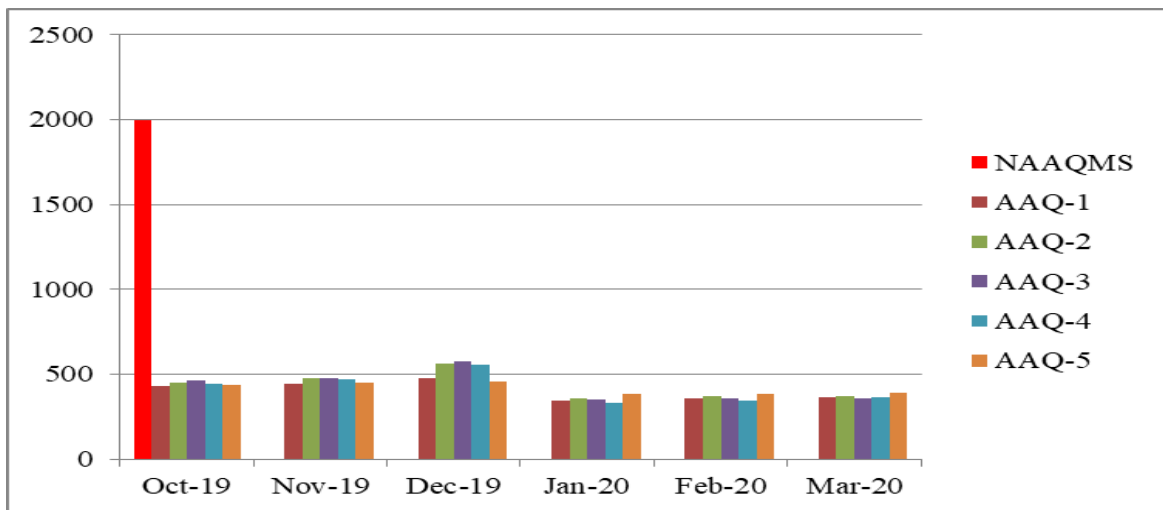




## NO<sub>x</sub>



## CO



### 2.2.1 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).

## 2.3 NOISE LEVEL

Noise Levels in & around the plant site are monitored on regular basis in day & night hours separately. Summarized observed values of Noise Level for the period October-2019 to March-2020 are given below in **Table-2.7** & **Table-2.8**.

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG
NL – 1	Boundary towards West Direction	51.8	52.4	51.2	55.7	56.7	55.3	51.2	56.7	53.6
NL – 2	Boundary towards North-East Direction	53.5	54.6	52.8	54.6	53.8	54.2	52.8	54.6	53.9
NL – 3	Boundary towards East Direction	53.2	51.3	48.1	56.7	52.7	54.2	48.1	56.7	52.4
NL – 4	Boundary towards North Direction	52.7	53.4	55.3	57.3	58.2	55.4	52.7	58.2	55.4
NL – 5	Boundary towards South West Direction	51.2	50.3	48.0	56.2	54.2	53.9	48	56.2	52.0

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG
NL – 1	Boundary towards West Direction	39.7	42.4	38.6	43.2	42.7	44.1	38.6	43.2	41.3
NL – 2	Boundary towards North-East Direction	45.8	43.9	44.7	47.3	45.9	46.2	43.9	47.3	45.5
NL – 3	Boundary towards East Direction	48.3	40.7	43.4	47.2	42.9	46.2	40.7	48.3	44.5
NL – 4	Boundary towards North Direction	48.3	46.2	47.1	52.1	51.7	50.8	46.2	52.1	49.1
NL – 5	Boundary towards South West Direction	47.5	46.4	45.2	53.4	51.4	49.9	45.2	53.4	48.8

### 2.3.1 RESULTS & DISCUSSION

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

## 2.4 STACK EMISSIONS

Operations of different unit stacks are going-on and monitoring was carried out for emissions. All stacks have been monitored during reporting period from April-2019 to Septemebr-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-2019</b>								
Ambient Temperature	°C	30.0	30.0	32.0	29.0	29.0	30.0	-
Flue Gas Temperature	°C	75.0	111.0	72.0	71.0	70.0	73.0	-
Velocity	m/s	7.3	7.8	7.2	7.9	7.1	7.4	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	171.6	58.1	37.1	9.2	9.2	89.8	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	22.3	19.7	24.3	23.4	23.1	27.7	<30.0
<b>November-2019</b>								
Ambient Temperature	°C	30.0	31.0	30.0	30.0	31.0	30.0	-
Flue Gas Temperature	°C	76.0	113.0	74.0	73.0	72.0	74.0	-
Velocity	m/s	7.2	7.6	7.1	7.5	7.3	7.2	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	168.7	56.3	36.4	9.6	9.4	87.1	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	22.3	20.8	23.3	25.2	22.6	28.4	<30.0

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

Particulars	Unit	Stack #1	Stack #2	Stack #3	Stack #4	Stack #5	Stack #6	Consent Status
Stack Attached with	-	Raw Mill RABH	Clinker Cooler ESP	Coal Mill Bag House	Cement Mill-1 Bag House	Cement Mill-2 Bag House	Slag Mill Bag House	
Stack Height	meter	64.0	43.0	57.7	56.1	56.1	48.0	-
Stack Inner Dia	meter	6.0	3.55	2.8	1.4	1.4	4.3	-
<b>December-2019</b>								
Ambient Temperature	°C	24.0	25.0	25.0	24.0	25.0	24.0	-
Flue Gas Temperature	°C	73.0	112.0	71.0	73.0	74.0	73.0	-
Velocity	m/s	6.5	7.6	6.7	7.0	7.1	7.8	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	153.7	56.5	34.7	9.0	9.1	94.7	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	21.1	19.9	24.4	25.9	23.3	27.2	<30.0
<b>January-2020</b>								
Ambient Temperature	°C	29.	30.0	31.0	30.0	31.0	30.0	-
Flue Gas Temperature	°C	75.0	109.0	75.0	74.0	75.0	76.0	-
Velocity	m/s	6.5	7.3	7.1	7.4	7.3	7.4	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	152.8	54.7	36.3	9.4	9.3	89.1	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	20.2	18.6	23.5	24.2	21.4	26.5	<30.0

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

Particulars	Unit	Stack #1	Stack #2	Stack #3	Stack #4	Stack #5	Stack #6	Consent Status
Stack Attached with	-	Raw Mill RABH	Clinker Cooler ESP	Coal Mill Bag House	Cement Mill-1 Bag House	Cement Mill-2 Bag House	Slag Mill Bag House	
Stack Height	meter	64.0	43.0	57.7	56.1	56.1	48.0	-
Stack Inner Dia	meter	6.0	3.55	2.8	1.4	1.4	4.3	-
<b>Febuary-2020</b>								
Ambient Temperature	°C	31.0	30.0	29.0	29.0	30.0	30.0	-
Flue Gas Temperature	°C	79.0	113.0	74.0	79.0	73.0	75.0	-
Velocity	m/s	6.5	7.1	6.7	6.5	6.9	7.3	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	151.0	52.6	34.4	8.2	8.8	88.1	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	18.6	17.5	24.3	23.7	20.2	28.5	<30.0
<b>March-2020</b>								
Ambient Temperature	°C	31.0	32.0	30.0	30.0	31.0	31.0	-
Flue Gas Temperature	°C	80.0	121.0	79.0	78.0	77.0	80.0	-
Velocity	m/s	7.1	7.5	6.9	6.9	7.5	7.4	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	164.5	55.2	34.9	8.7	9.5	88.0	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	19.3	20.3	23.3	24.9	22.2	27.3	<30.0

Particulars	Unit	Stack #7					
		Boiler					
Stack Attached with	-	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Stack Height	meter	85					
Stack Inner Dia	meter	2.0					
Ambient Temperature	0C	30	29.0	29.0	28.0	30	31.0
Flue Gas Temperature	0C	125	127.0	124.0	122.0	126.0	127.0
Velocity	m/s	17.3	18.5	16.9	15.3	17.4	16.3
Total Volumetric Flow	Nm3/sec	39.5	42.0	38.6	35.2	39.6	37.0
Total Particulate Matter (TPM)	mg/Nm3	28.5	29.2	26.7	27.7	25.4	26.5
Sulphur Dioxide (SO <sub>2</sub> )	mg/Nm3	78.4	79.9	76.8	80.9	81.4	81.7
Oxides of Nitrogen (NO <sub>x</sub> )	mg/Nm3	23.1	25.9	24.7	22.6	23.4	25.6
Mercury ( Hg)	mg/Nm3	0.005	0.005	0.005	0.005	0.005	0.005

#### 2.4.1 RESULTS & DISCUSSION

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

## 2.5 WATER (GROUND & SURFACE) QUALITY

### 2.5.1 GENERAL

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

### 2.5.2 LOCATION OF WATER QUALITY SAMPLING

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

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

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

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

### 2.4.3 OBSERVATIONS

The characteristics of ground water samples and surface water sample for the period October-2019 to March-2020, are presented below in **Table – 2.11** & **Table – 2.12**.

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

Date of Sampling			05.03.2020						
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	4.4
5.	Total Dissolved Solids	mg/l	500	2000	514	524	532	472	368
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.18	7.07	7.17	7.19	7.65
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.9	3.4	3.7	3.9	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	-	-	6	10	7	6	17
10.	Conductivity	µS/cm	-	-	814	817	838	768	619
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	186	204	188	176	164
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	166	188	198	184	150
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	66	75.2	108	98	60.0
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	14.9	15.8	16.7	16.6	13.1
15.	Chlorides as Cl	mg/l	250	1000	78	64	68	62	54
16.	Sulphates as SO <sub>4</sub>	mg/l	200	400	53.2	50.3	62.5	51.9	23.4

Table contd...



Table contd...

Sr. No.	Parameters	Unit	As per IS 10500:2012		Values				
			Desirable	Permissible	GW-1	GW-2	GW-3	GW-4	SW-1
17.	Fluoride as F	mg/l	1.0	1.5	0.39	0.49	0.34	0.47	0.13
18.	Nitrates as NO <sub>3</sub>	mg/l	45	NR	3.9	6.2	7.0	7.2	3.9
19.	Iron as Fe	mg/l	0.3	NR	0.19	0.25	0.20	0.14	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	77
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	0	9
<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			24.12.2019						
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	3.7
5.	Total Dissolved Solids	mg/l	500	2000	514	523	531	469	412
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.14	7.18	7.40	7.35	7.98
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.6	3.8	3.9	3.6	5.2
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	-	-	6	10	7	9	27
10.	Conductivity	µS/cm	-	-	847	833	861	698	597
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	204	221	208	196	179
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	194	202	198	201	163
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	51.6	53.6	54.0	51.0	37.0
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	16.1	16.4	17.4	15.9	14.3
15.	Chlorides as Cl	mg/l	250	1000	86	71	77	73	49
16.	Sulphates as SO <sub>4</sub>	mg/l	200	400	53.5	50.9	65.8	55.3	29.5

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	0.39	0.49	0.34	0.47	0.13
18.	Nitrates as NO <sub>3</sub>	mg/l	45	NR	3.9	6.2	7.0	7.2	3.9
19.	Iron as Fe	mg/l	0.3	NR	0.19	0.25	0.20	0.14	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	77
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	0	9
<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.

## 2.6 SOIL QUALITY

### 2.6.1 GENERAL

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

### 2.6.2 LOCATIONS OF SOIL MONITORING

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

**TABLE – 2.13: DETAILS OF SAMPLING STATIONS OF SOIL ANALYSIS**

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

### 2.6.3 OBSERVATIONS

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

**TABLE – 2.14: SOIL QUALITY REPORT**

Date of Sampling		24.12.2019		
Sr. No.	Parameters	Unit	S-1	S-2
<b>A.</b>	<b>Physical Properties</b>			
1.	Bulk Density	g/cc	1.33	1.24
2.	Particle Size Distribution	% Gravel	8.8	3.8
		% Sand	35.9	32.7
		% Silt	28.4	31.9
		% Clay	26.9	31.6

Table contd...

Sr. No.	Parameters	Unit	S-1	S-2
3.	Soil Texture	-	Clay Loam	Clay Loam
4.	Porosity	%	42.3	46.5
5.	Water Holding Capacity	%	32.7	35.3
<b>B.</b>	<b>Chemical Properties</b>			
1.	pH at 25 °C	-	6.83	6.65
2.	Electrical Conductivity	mmhos/cm	0.135	0.176
3.	Organic Carbon	%	0.45	0.69
4.	Cation Exchange Capacity	meq/100 gm	27.1	35.9
5.	Exchangeable Calcium as Ca <sup>++</sup>	mg/kg	45.1	58.9
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	13.5	20.3
7.	Chlorides as Cl	mg/kg	88.6	107.4
8.	Sulphate as SO <sub>4</sub>	mg/kg	104..5	118.6
9.	Nitrogen as N	kg/ha	90.8	296.4
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	59.1	104.9
11.	Potassium as K <sub>2</sub> O	kg/ha	98.6	298.1

**TABLE – 2.15: SOIL QUALITY REPORT**

Date of Sampling		06.03.2020		
Sr. No.	Parameters	Unit	S-1	S-2
<b>A.</b>	<b>Physical Properties</b>			
1.	Bulk Density	g/cc	1.29	1.30
2.	Particle Size Distribution	% Gravel	7.4	4.6
		% Sand	33.4	32.4
		% Silt	30.9	30.1
		% Clay	28.3	32.9
3.	Soil Texture	-	Clay Loam	Clay Loam
4.	Porosity	%	40.3	43.5
5.	Water Holding Capacity	%	34.3	37.7
<b>B.</b>	<b>Chemical Properties</b>			
1.	pH at 25 °C	-	6.94	6.80
2.	Electrical Conductivity	mmhos/cm	0.138	0.178
3.	Organic Carbon	%	0.44	0.73
4.	Cation Exchange Capacity	meq/100 gm	25.7	39.9
5.	Exchangeable Calcium as Ca <sup>++</sup>	mg/kg	47.3	63.2
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	14.9	21.7
7.	Chlorides as Cl	mg/kg	87.6	115.4
8.	Sulphate as SO <sub>4</sub>	mg/kg	104.5	135.3
9.	Nitrogen as N	kg/ha	86.6	312.5
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	65.5	102.4
11.	Potassium as K <sub>2</sub> O	kg/ha	93.7	268.5

#### 2.6.4 STANDARD SOIL CLASSIFICATION

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

**TABLE – 2.16: STANDARD SOIL CLASSIFICATION**

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



5.	Phosphorous (kg/ha)	upto 15 very less 16-30 less 31-50 medium	51-65 on an average sufficient 65-80 sufficient > 80 more than sufficient
6.	Potassium (kg/ha)	0 very less 120-180 less 181-240 medium	241-300 average 301-360 better > 360 more than sufficient

## 2.6.5 RESULTS AND DISCUSSION

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

- (a) The **bulk density** of soil samples are **1.33 & 1.24** and **1.29 & 1.30** g/cm<sup>3</sup> respectively.
- (b) Soil samples have **6.83 & 6.65** and **6.94 & 6.80 pH value** respectively. The pH value is indicating neutral to slightly alkaline in nature.
- (c) Soil samples have **conductivity 0.135 & 0.176** and **0.138 & 0.178** mmhos/cm respectively.
- (d) Soil samples have **Organic Carbon 0.45 & 0.69** 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 **90.8 & 296.4** and **86.6 & 312.5** kg/ha respectively.
- (f) Soil samples have also sufficient concentration of **Available Phosphorous** as its value is **59.1 & 104.9** and **65.5 & 102.4** kg/ha respectively.
- (g) Soil samples have less concentration of **Available Potassium** as its value is **98.6 & 298.1** and **93.7 & 298.1** kg/ha respectively.

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

## 2.7 TREATED WASTEWATER QUALITY

### 2.7.1 GENERAL

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

### 2.7.2 LOCATION OF WASTEWATER QUALITY SAMPLING

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

### 2.7.3 OBSERVATIONS

The monthly characteristics of Sewage Treatment plant and WHR recycled water samples for the period from October-2019 to March-2020, 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-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
1.	pH	-	5.5-9.0	7.60	7.42	7.51	7.52	7.62	7.68
2.	BOD	mg/l	30	5.2	4.9	4.3	6.0	5.0	6.0
3.	COD	mg/l	250	32	28	22	24	26	32
4.	TSS	mg/l	100	14	16	10	18	20	22
5.	N-Total	mg/l	100	6.9	5.8	6.1	6.7	6.2	6.4
6.	NH4- N	mg/l	50	1.5	1.8	1.9	2.8	2.6	2.7

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

Sr. No.	Parameter	Unit	Standards as EPA-1986 (Schedule-VI)	Values					
				Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
1.	pH	-	5.5-9.0	7.20	7.16	7.24	7.19	7.24	7.27
2.	BOD	mg/l	30	4.1	4.6	4.9	4.4	4.6	4.8
3.	COD	mg/l	250	30	31	29.4	34	42	30
4.	TSS	mg/l	100	8	10	10	14	12	12
5.	N-Total	mg/l	100	7.7	7.1	6.9	9.2	8.8	7.8
6.	NH4- N	mg/l	50	2.6	2.9	2.1	3.2	3.4	2.8

#### 2.7.4 OBSERVATIONS

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

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

# ENVIRONMENTAL STATUS REPORT

(Half-yearly Report for October-2019 to March-2020)

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**

**Head Office:** 20, IT Park, Parsodi, Nagpur- 440022 (M.S.)  
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**Lab.:** 'MoEF recognized & NABL Accredited Environmental Laboratory'  
CHW-01, Mouza-Mandwa, MIDC Industrial Area  
Butibori, Dist. Nagpur

**March - 2020**

## 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-2019 to March-2020** (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.

Place : **NAGPUR**  
Date : **10.04.2020**

For **MAHARASHTRA ENVIRO POWER**



**Dr. D. G. BATTALWAR**  
Authorized Signatory

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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-2019 to March-2020**.

## 2.0 SUMMARIZED ENVIRONMENTAL BASELINE DATA FOR PERIOD OCTOBER-2019 TO MARCH-2020

Regular environmental monitoring in & around the mine lease area is carried out. ‘Summarized Environmental Baseline Data’ for the period October-2019 to March-2020 is presented below.

### 2.1 MICRO-METEOROLOGICAL DATA

#### 2.1.1 OBSERVATION

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

**TABLE – 2.1:**  
**Micro-Meteorological Data for Period October-2019 to March-2020**

Sr. No.	Months	Minimum	Maximum
<b>WIND SPEED (km/hr)</b>			
1.	October - 2019	0.0	12.8
2.	November - 2019	0.1	11.4
3.	December - 2019	0.0	9.4
4.	January - 2020	0.0	3.3
5.	February - 2020	0.0	4.3
6.	March - 2020	0.0	4.0
<b>AMBIENT TEMPERATURE (°C)</b>			
1.	October - 2019	22.5	35.0
2.	November - 2019	17.9	33.0
3.	December - 2019	9.2	30.7
4.	January - 2020	10.1	30.7
5.	February - 2020	12.8	32.7
6.	March - 2020	17.5	34.9

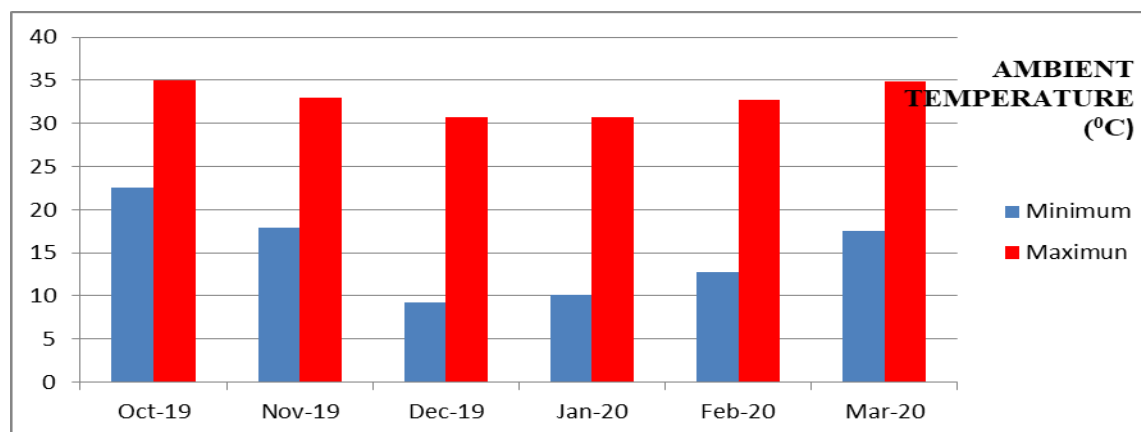
table contd...



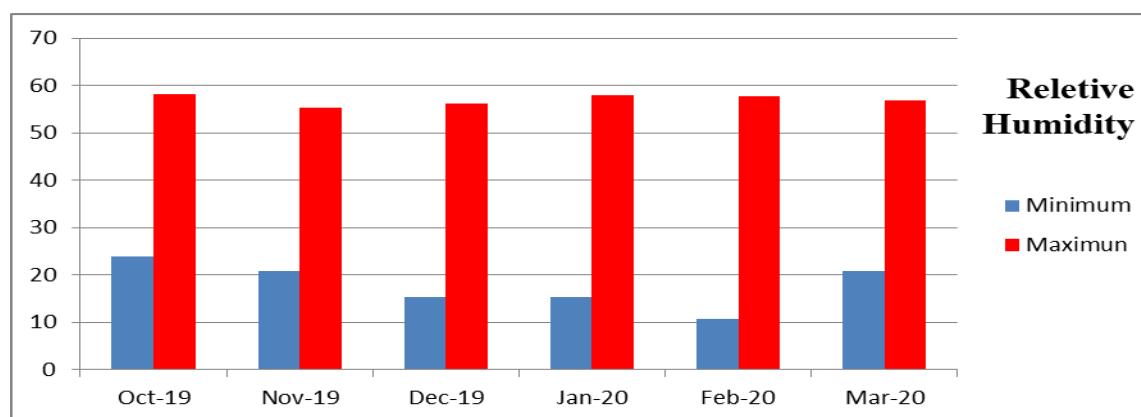
table contd...

<b>RELATIVE HUMIDITY (%)</b>			
1.	October - 2019	23.9	58.2
2.	November - 2019	20.8	55.4
3.	December - 2019	15.4	56.2
4.	January - 2020	15.2	57.9
5.	February - 2020	10.6	57.7
6.	March - 2020	20.8	56.8
<b>ATMOSPHERIC PRESSURE (mm-Hg)</b>			
1.	October - 2019	841.0	861.7
2.	November - 2019	837.9	849.2
3.	December - 2019	833.7	859.2
4.	January - 2020	836.6	865.5
5.	February - 2020	834.1	864.0
6.	March - 2020	838.4	855.4

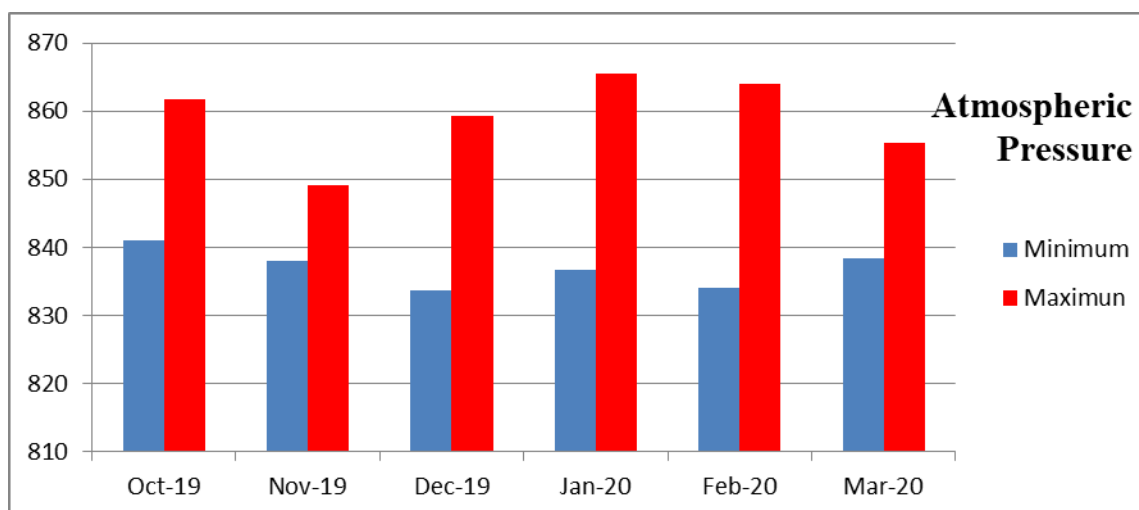
### Graphical Presentation of Ambient Temperature



### Graphical Presentation of Relative Humidity



### Graphical Presentation of Atmospheric Pressure



#### 2.1.2 RESULTS AND DISCUSSION

- 3 Total **rainfall** for the period October-2019 to March-2020 was 232.5 mm and out of which, 75.0 mm rainfall was found in month October-2019.
- 4 Mostly **wind** was found (<12.8 km/hr) and maximum time wind was predominated from East and E-SE direction during period October-2019 to March-2020. Maximum wind speed was observed in month of October-2019 and speed was 12.8 km/hr.
- 5 Ambient **temperature** was monitored on hourly basis for minimum & maximum during period October-2019 to March-2020. Observed minimum temperature was 9.2 °C in month December-2019 and maximum temperature was 35.0 °C in month October-2019.
- 6 Relative **humidity** was monitored on hourly basis for minimum & maximum during period October-2019 to March-2020. Observed minimum humidity was 10.6 % in months February-2020 and maximum humidity was 58.2% also in month October-2019.
- 7 **Atmospheric pressure** was monitored on daily basis during period October-2019 to March-2020. Observed minimum atmospheric pressure was 833.7 mm-Hg in month December -2019 and maximum atmospheric pressure was 865.5 mm-Hg in months January-2020.

## 2.2 AMBIENT AIR QUALITY (AAQ)

Monitored Ambient Air Quality values (parameter-wise) in & around the mine lease area for the period October-2019 to March-2020 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-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ -1	Near Mine Office	52.6	54.3	53.8	55.2	55.6	61.4	52.6	61.4	55.5	60.8
AAQ -2	Lease Boundary towards North Direction	56.3	56.7	57.5	58.6	61.3	63.2	56.3	63.2	58.9	63.0
AAQ -3	Lease Boundary towards East Direction	52.8	54.5	56.1	53.1	54.6	55.4	52.8	56.1	54.4	56.0
AAQ -4	Lease Boundary towards South Direction	50.5	52.2	52.9	51.3	54.4	53.2	50.5	54.4	52.4	54.3
AAQ -5	Lease Boundary towards South - East	57.2	57.8	58.6	59.8	60.6	61.3	57.2	61.3	59.2	61.2

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ -1	Near Mine Office	22.8	23.5	23.1	27.8	28.9	29.7	22.8	29.7	26.0	29.6
AAQ -2	Lease Boundary towards North Direction	24.3	25.5	26.9	28.4	29.7	30.9	24.3	30.9	27.6	30.8
AAQ -3	Lease Boundary towards East Direction	23.8	24.3	25.5	26.2	25.3	25.7	23.8	26.2	25.1	26.2
AAQ -4	Lease Boundary towards South Direction	20.3	24.8	28.2	25.1	24.2	23.4	20.3	28.2	24.3	27.9
AAQ -5	Lease Boundary towards South - East	21.7	22.1	23.3	26.9	28.1	33.1	21.7	33.1	25.9	32.6

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	14.8	16.6	19.1	15.4	16.7	17.3	14.8	19.1	16.7	18.9
AAQ-2	Lease Boundary towards North Direction	17.1	15.5	20.8	17.3	16.3	14.6	14.6	20.8	16.9	20.5
AAQ-3	Lease Boundary towards East Direction	11.2	13.2	11.9	14.4	11.2	12.6	11.2	14.4	12.4	14.3
AAQ-4	Lease Boundary towards South Direction	10.6	11.6	12.6	14.0	13.3	11.7	10.6	14	12.3	13.9
AAQ-5	Lease Boundary towards South - East	10.2	12.1	11.4	11.0	12.4	13.5	10.2	13.5	11.8	13.4

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

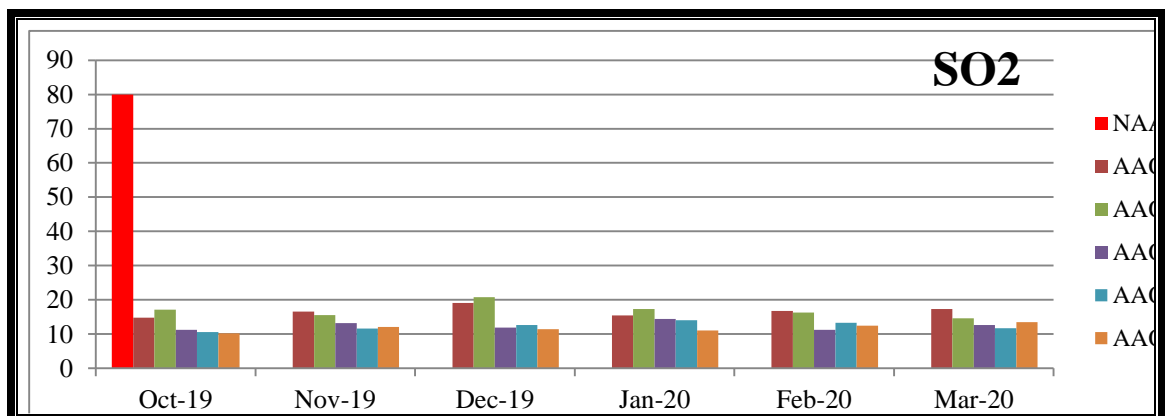
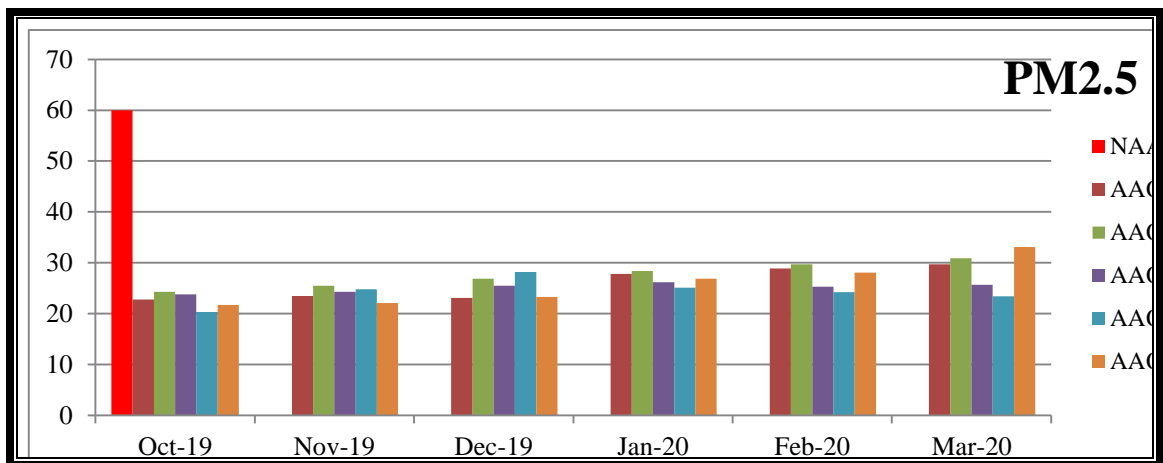
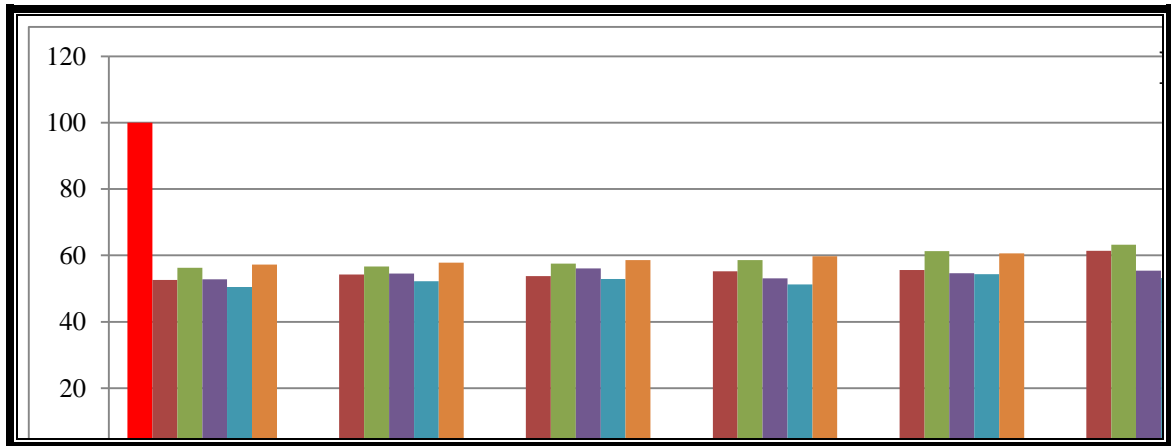
Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	20.6	21.4	24.3	24.7	25.6	24.6	20.6	25.6	23.5	25.5
AAQ-2	Lease Boundary towards North Direction	19.3	20.9	25.1	24.9	21.3	20.7	19.3	25.1	22.0	25.1
AAQ-3	Lease Boundary towards East Direction	18.6	20.2	22.2	22.3	22.7	18.5	18.5	22.7	20.8	22.7
AAQ-4	Lease Boundary towards South Direction	17.9	18.4	20.3	19.4	21.0	15.6	15.6	21	18.8	20.9
AAQ-5	Lease Boundary towards South - East	18.3	17.8	19.5	18.2	18.7	19.2	17.8	19.5	18.6	19.5

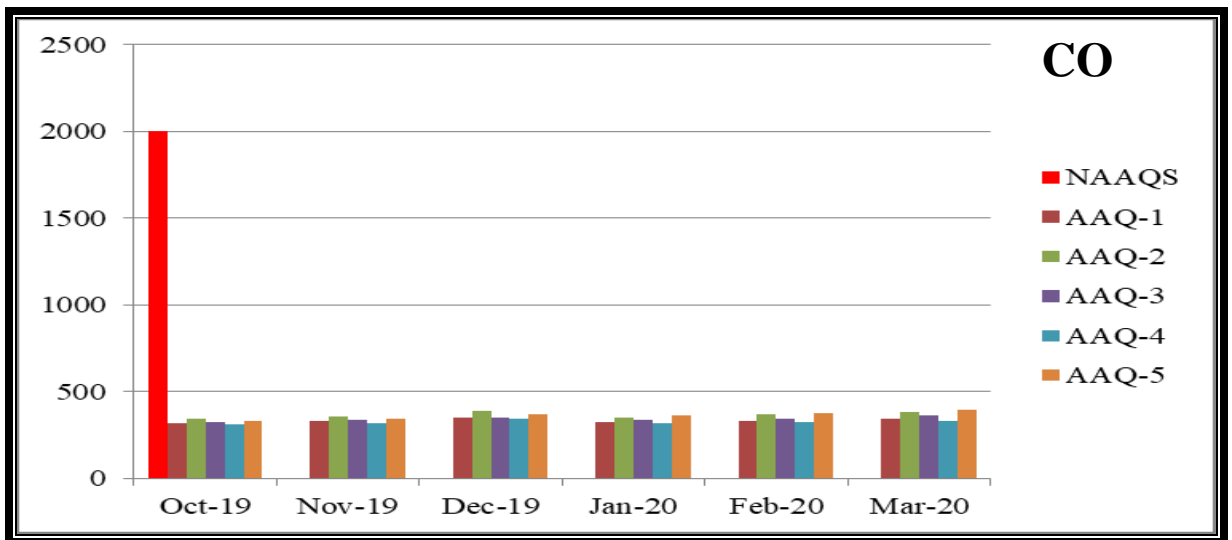
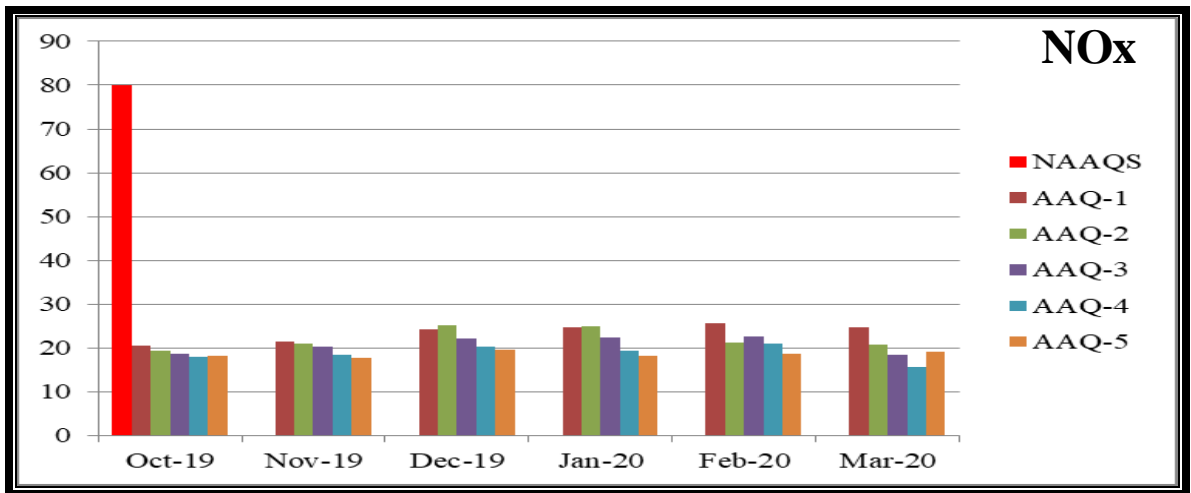
**TABLE – 2.6: Carbon Monoxide (CO)**

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG	98 percentile
AAQ-1	Near Mine Office	316	330	348	326	330	342	316	330	348	326
AAQ-2	Lease Boundary towards North Direction	344	359	391	354	369	384	344	359	391	354
AAQ-3	Lease Boundary towards East Direction	324	338	354	338	342	362	324	338	354	338
AAQ-4	Lease Boundary towards South Direction	311	320	343	321	328	334	311	320	343	321
AAQ-5	Lease Boundary towards South - East	330	346	371	364	376	398	330	346	371	364

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

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





### 2.2.1 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).

## 2.3 NOISE LEVEL

Noise Levels in & around the mine lease area are monitored on regular basis in day & night hours separately. Summarized observed values of Noise Level for the period April-2019 to September-2019 are given below in **Table-2.7** & **Table-2.8**.

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG
NL – 1	Near Mine Office	45.5	44.4	43.1	47.0	54.3	53.7	43.1	54.3	48.0
NL – 2	Lease Boundary towards North Direction	48.7	48.5	47.5	54.5	51.9	56.4	47.5	56.4	51.3
NL – 3	Lease Boundary towards East Direction	46.5	47.3	46.7	55.7	55.4	51.6	46.5	55.7	50.5
NL – 4	Lease Boundary towards South Direction	47.1	45.7	44.3	45.3	47.3	49.4	44.3	49.4	46.5
NL – 5	Lease Boundary towards South - East	46.4	48.1	46.4	47.0	49.3	50.5	46.4	50.5	48.0

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

Code	Stations	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	MIN	MAX	AVG
NL – 1	Near Mine Office	37.7	35.2	34.8	46.0	48.6	49.4	34.8	49.4	42.0
NL – 2	Lease Boundary towards North Direction	40.1	38.9	38.2	48.3	46.6	51.6	38.2	51.6	44.0
NL – 3	Lease Boundary towards East Direction	37.5	36.7	36.3	46.7	46.1	49.1	36.3	49.1	42.1
NL – 4	Lease Boundary towards South Direction	38.0	37.3	37.4	47.5	48.5	44.7	37.3	48.5	42.2
NL – 5	Lease Boundary towards South - East	37.2	36.9	36.7	45.0	44.1	46.5	36.7	46.5	41.1

### 2.3.1 RESULTS & DISCUSSION

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

## 2.4 STACK EMISSIONS

Crusher stack is operational and monitoring was carried out for emissions. Stack attached to 800 TPH Crusher has been monitored for the period October-2019 to March-2020 for required parameters. Results are presented in **Table – 2.9**.

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

Particulars	Unit	Stack #1						Consent Status
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	
Stack Attached with	-	800 TPH Crusher						-
Stack Height	Meter	32.0						-
Stack Diameter	Meter	1.5						-
Ambient Temperature	°C	28.0	30.0	24.0	31.0	30.0	30.0	-
Flue Gas Temperature	°C	45.0	46.3	46.0	47.0	45.0	52.0	-
Velocity	m/s	6.3	6.5	6.9	6.8	7.1	7.1	-
Total Volumetric Flow	Nm <sup>3</sup> /sec	10.1	10.4	11.0	10.8	11.4	11.1	-
Total Particulate Matter (TPM)	mg/Nm <sup>3</sup>	24.7	26.4	31.2	25.4	24.7	32.6	< 50.0

### 2.4.1 RESULTS & DISCUSSION

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



## 2.5 WATER (GROUND & SURFACE) QUALITY

### 2.5.1 GENERAL

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

### 2.5.2 LOCATION OF WATER QUALITY SAMPLING

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

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

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

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

### 2.4.3 OBSERVATIONS

The characteristics of ground water samples and surface water sample for the period October-2020 to March-2020, are presented below in **Table – 2.11 & Table – 2.12**.

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

Date of Sampling			23.12.2019					
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	3.7
5.	Total Dissolved Solids	mg/l	500	2000	498	516	438	362
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.09	7.21	7.17	7.52
7.	Dissolved Oxygen (DO)	mg/l	-	-	1.2	1.5	1.7	5.4
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	-	-	9	8	6	20
10.	Conductivity	µS/cm	-	-	814	838	642	519
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	204	201	179	147
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	184	168	194	132
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	50.3	51.0	48.9	35.8
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	15.4	16.2	14.9	11.7
15.	Chlorides as Cl	mg/l	250	1000	62	59	48	32
16.	Sulphates as SO <sub>4</sub>	mg/l	200	400	40.1	54.7	44.2	21.8

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	0.18	0.10	0.21	0.28
18.	Nitrates as NO <sub>3</sub>	mg/l	45	NR	6.3	7.4	9.0	10.8
19.	Iron as Fe	mg/l	0.3	NR	0.08	0.14	0.02	0.05
20.	Manganese as Mn	mg/l	0.1	0.3	< 0.01	< 0.01	< 0.01	< 0.01
21.	Zinc as Zn	mg/l	5.0	15.0	BDL	BDL	BDL	BDL
22.	Copper as Cu	mg/l	0.05	1.5	< 0.01	< 0.01	< 0.01	< 0.01
23.	Aluminium as Al	mg/l	0.03	0.2	< 0.01	< 0.01	< 0.01	< 0.01
24.	Boron as B	mg/l	0.5	1.0	< 0.01	< 0.01	< 0.01	< 0.01
25.	Total Coliform	MPN/100 ml	Absent	NR	0	0	0	19
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	4
<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			07.03.2020					
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	1.6
5.	Total Dissolved Solids	mg/l	500	2000	516	528	494	442
6.	pH at 25 °C	-	6.5 – 8.5	NR	7.32	7.22	7.31	8.02
7.	Dissolved Oxygen (DO)	mg/l	-	-	3.6	3.3	3.2	7.2
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	11
10.	Conductivity	µS/cm	-	-	745	802	740	658
11.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	200	600	180	202	188	192
12.	Total Hardness as CaCO <sub>3</sub>	mg/l	200	600	218	238	212	174
13.	Calcium as Ca <sup>++</sup>	mg/l	75	200	59.2	62.3	56.4	46.2
14.	Magnesium as Mg <sup>++</sup>	mg/l	30	100	17.9	20.2	18.3	14.3
15.	Chlorides as Cl	mg/l	250	1000	70	67	64	56
16.	Sulphates as SO <sub>4</sub>	mg/l	200	400	51.2	52.2	53.6	28.3

Table contd...

Table contd...

Sr. No.	Parameters	Unit	As per IS 10500:2012		Values			
			Desirable	Permissible	GW-1	GW-2	GW-3	SW-1
17.	Fluoride as F	mg/l	1.0	1.5	0.54	0.65	0.62	0.16
18.	Nitrates as NO <sub>3</sub>	mg/l	45	NR	9.3	11.3	12.4	7.3
19.	Iron as Fe	mg/l	0.3	NR	0.14	0.21	0.22	0.09
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	66
26.	E. Coli	MPN/100 ml	Absent	NR	0	0	0	09
<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

#### **2.5.4 RESULTS AND DISCUSSION**

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

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

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

## 2.6 SOIL QUALITY

### 2.6.1 GENERAL

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

### 2.6.2 LOCATION OF SOIL MONITORING

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

**TABLE –2.13: DETAILS OF SAMPLING STATIONS OF SOIL ANALYSIS**

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

### 2.6.3 OBSERVATIONS

The physico-chemical characteristics of soil sample for the period October-2019 to March-2020 have reported in **Table– 2.14** & **Table– 2.15**.

**TABLE – 2.14: SOIL QUALITY REPORT**

Date of Sampling		23.12.2019			
Sr. No.	Parameters	Unit	S-1	S-2	S-3
<b>A.</b>	<b>Physical Properties</b>				
1.	Bulk Density	g/cc	1.58	1.62	1.31
2.	Particle Size Distribution	% Gravel	10.1	9.4	3.1
		% Sand	39.4	38.1	30.3
		% Silt	28.2	29.8	34.2
		% Clay	22.3	22.7	32.4

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	%	41.1	44.3	35.7
5.	Water Holding Capacity	%	31.2	29.8	38.5
<b>B.</b>	<b>Chemical Properties</b>				
1.	pH at 25 0C	-	6.95	7.10	6.74
2.	Electrical Conductivity	mmhos/cm	0.128	0.141	0.201
3.	Organic Carbon	%	0.39	0.56	1.24
4.	Cation Exchange Capacity	meq/100 gm	25.6	23.2	38.3
5.	Exchangeable Calcium as Ca <sup>++</sup>	mg/kg	42.7	40.4	62.5
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	12.5	14.9	24.3
7.	Chlorides as Cl	mg/kg	68.4	54.9	95.6
8.	Sulphate as SO <sub>4</sub>	mg/kg	97.5	101.7	114.6
9.	Nitrogen as N	kg/ha	98.2	100.4	401.2
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	62.1	46.8	129.1
11.	Potassium as K <sub>2</sub> O	kg/ha	72.4	88.7	292.8

**TABLE – 2.15: SOIL QUALITY REPORT**

Date of Sampling	07.03.2020
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Sr. No.	Parameters	Unit	S-1	S-2	S-3
<b>A.</b>	<b>Physical Properties</b>				
1.	Bulk Density	g/cc	1.38	1.35	1.24
2.	Particle Size Distribution	% Gravel	9.4	9.4	4.7
		% Sand	36.1	35.8	35.3
		% Silt	30.1	31.5	32.4
		% Clay	24.4	23.3	27.6

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	%	40.5	40.4	43.6
5.	Water Holding Capacity	%	35.3	34.2	36.7
<b>B.</b>	<b>Chemical Properties</b>				
1.	pH at 25 0C	-	7.21	7.25	6.92
2.	Electrical Conductivity	mmhos/cm	0.158	0.163	0.192
3.	Organic Carbon	%	0.42	0.44	0.78
4.	Cation Exchange Capacity	meq/100 gm	25.9	27.8	32.6
5.	Exchangeable Calcium as Ca <sup>++</sup>	mg/kg	44.5	45.3	54.6
6.	Exchangeable Magnesium as Mg <sup>++</sup>	mg/kg	10.7	11.2	17.3
7.	Chlorides as Cl	mg/kg	87.1	86.5	81.4
8.	Sulphate as SO <sub>4</sub>	mg/kg	89.6	93.5	102.3
9.	Nitrogen as N	kg/ha	71.4	76.4	318.3
10.	Phosphorous as P <sub>2</sub> O <sub>5</sub>	kg/ha	65.7	67.1	98.4
11.	Potassium as K <sub>2</sub> O	kg/ha	69.9	74.2	265.3

#### 2.6.4 STANDARD SOIL CLASSIFICATION

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

**TABLE – 2.16: STANDARD SOIL CLASSIFICATION**

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

## 2.6.5 RESULTS AND DISCUSSION

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

- (a) The **bulk density** of all soil samples are 1.58, 1.62 & 1.31 and 1.38, 1.35 & 1.24 g/cm<sup>3</sup> respectively.
- (b) All soil samples have 6.95, 7.10 & 6.74 and 7.21, 7.25 & 6.92 **pH value** respectively. The pH value is indicating neutral to slightly alkaline in nature.
- (c) All soil samples have **conductivity** 0.128, 0.141 & 0.201 and 0.158, 0.163 & 0.192 mmhos/cm respectively.
- (d) All soil samples have **Organic Carbon** 0.39, 0.56 & 1.24 and 0.42, 0.44 & 0.78% respectively. This represents medium fertility of soils.
- (e) All soil samples have sufficient concentration of **Available Nitrogen** as its values are 98.2, 100.4 & 401.2 and 71.4, 76.4 & 318.3 kg/ha respectively.
- (f) All soil samples have also sufficient concentration of **Available Phosphorous** as its values are 62.1, 46.8 & 129.1 and 65.7, 67.1 & 98.4 kg/ha respectively.
- (g) All soil samples have less concentration of **Available Potassium** as its values are 72.4, 88.7 & 292.8 and 69.9, 74.4 & 265.3 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---