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CIN : L26942OR1949PLC000185

  
**OCL INDIA LIMITED**  
ओसीएल इण्डिया लिमिटेड

*Ole*

The State Environment Impact Assessment Authority,  
(SEIAA), ODISHA  
Qtr. No. 5RF-2/1, Unit – IX,  
BHUBANESWAR – 751022

**Sub:- Submission of six monthly compliance report for the period (April, 2017 to Sept, 2017) of (2x27 MW) Captive Power Plant of M/s OCL India Limited, Rajgangpur, Dist- Sundargarh, Odisha.**

Ref: - Environmental Clearance letter No. SEIAA 619 / SEIAA – 128/10, dated 22 December 2010.

Dear Sir,

With reference to above letter, we enclose herewith the six monthly compliance report (Ending September, 2017) of conditions stipulated in the Environmental Clearance for the above project.

Thanking you

Yours sincerely

Yours sincerely  
For OCL India Limited

  
(S.K.Rout)

Dy. Executive Director (Mines & Env.)

Encl: As above

Copy to:  
The Director (S)  
Government of India  
Ministry of Environment, Forest & Climate Change  
Eastern Regional Office, A/3, Chandrasekharpur  
BHUBANESWAR - 751023

**SIX MONTHLY COMPLIANCE REPORT  
(APRIL, 2017 TO SEPTEMBER, 2017)**

**OF**

**ENVIRONMENT CLEARANCE LETTER NO.  
SEIAA 619 / SEIAA-128/10 DATED 22 DEC, 2010**

**FOR**

**(2X27 MW) CAPTIVE POWER PLANT PROJECT**

**BY**

**OCL INDIA LIMITED  
RAJGANGPUR-770017  
DIST-SUNDARGARH  
ODISHA**

**OCL INDIA LIMITED, RAJGANGPUR**

Sub: Submission of Six monthly compliance report (April, 2017 to September, 2017) of condition stipulated in Environmental Clearance letter No. SEIAA 619 / SEIAA-128/10 dated 22 December 2010 by SEIAA, Odisha for (2x27MW) Captive Power Plant Project of M/s OCL India Limited, Rajgangpur.

SL.No.	Description of condition	Compliance status
i	<p>The applicant (Project proponent) will take necessary measures for prevention, control and mitigation of Air Pollution, Water pollution, Noise pollution and Land pollution including solid waste management as mentioned by him in form-1, Final EIA reports and Environment Management Plant (EMP) in compliance with the prescribed statutory norms and standards.</p>	<p>Following Pollution control systems are installed for prevention , control of pollution and mitigation of Air, Water, Noise, &amp; Land pollution including solid waste management –</p> <p><b><u>Air Pollution Control</u></b></p> <ul style="list-style-type: none"> <li>• Two nos. high efficiency Electrostatic Precipitator (ESP) with six fields</li> <li>• Pneumatic ash conveying system</li> <li>• Ash storage silos with bag filter arrangement</li> <li>• Pneumatic ash transportation system from CPP to our cement plant</li> <li>• Conveyor belt covering arrangement</li> <li>• 8 nos. bag filters are installed in Coal handling transfer points</li> <li>• Water sprinkling arrangement on the road and side cladding wall of 30 mtr. Height for preventing fugitive dust generation.</li> </ul> <p><b><u>Water pollution Control</u></b></p> <ul style="list-style-type: none"> <li>• STP has already been commissioned and treated water is utilized for green belt development/ plantation.</li> <li>• Water generated from process are recycled and reused. Also rain water harvested in-side plant.</li> </ul> <p><b><u>Noise Pollution Control</u></b></p> <ul style="list-style-type: none"> <li>• Compressor, TG area and ACC is acoustically sealed to prevent noise pollution.</li> <li>• In stream vent line silencers are provided.</li> <li>• Fan and seal blower silencers arrangement made.</li> </ul> <p><b><u>Solid Waste Management</u></b></p> <ul style="list-style-type: none"> <li>• Sludge from STP is utilized for green belt development / plantation.</li> <li>• Solid waste (fly ash &amp; Bottom ash) is utilized</li> </ul>

		as raw material for cement manufacturing process in our own cement plant
ii	The applicant will take necessary steps for Socio-economic development of the people of the area on need based assessment for providing employment education , health care, drinking water and sanitation, road and communication facilities etc., after a detailed primary socio economic survey of the core zone.	A detailed socio-economic survey report has already been submitted. All steps are been taken under various CSR activities.
iii	The applicant will comply with the points, concerns and issued raised by the people during public hearing on 29 <sup>th</sup> May 2009 in accordance with the comments made by him thereon.	Complied
iv	The applicant will take statutory clearance / approval / permission from the concerned authorities in respect of his project as and when required.	Complied
v	For post environmental clearance monitoring , the applicant will submit half yearly compliance report in respect of the stipulated terms and conditions of Environmental clearance to the State Environmental Impact Authority (SEIAA/), Orissa on 1 <sup>st</sup> june and 1 <sup>st</sup> December of each calendar year.	The half yearly Compliance report is being submitted regularly.
vi	High efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate matter emission does not exceed 50 mg/Nm <sup>3</sup> .	Complied and stack emission are well within standard. The revised standard for TPP as per MoEF&CC notification No. S.O.-3305(E ), Dtd. 7.12.2015 to be abide thereof.
vii	The proponent may use bottom ash as a supplement for the raw material for cement production with approved technology confirming to the relevant standards specification.	We have established use of bottom ash in cement manufacturing process and accordingly mix is prepared in confirmation to the standards.
viii	The unit shall be allowed to use Washery rejects as raw material having <60% ash content	Complied
ix	The proponent shall treat the flue gas through Flue Gas De-sulfurisation (FGD), if SO <sub>2</sub> emission level exceeds the prescribed norm	Adequate measures are taken to control So <sub>2</sub> emission. Present limits are well within the prescribed standard.
x	No ground water shall be extracted for the project work at any stage.	Noted for compliance
xi	Adequate dust extraction system such as cyclones/ bag filters and water spray system in dust areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas	Adequate dust extraction systems are installed as mentioned below- i) 8 nos of bag filters in coal handling transfer points to control fugitive dust

	shall be provided.	<p>ii) 3 nos of bag filter in flyash silo areas to control fugitive dust.</p> <p>iii) Pneumatic fly ash transportation system from CPP to cement plant is commissioned to eliminate fugitive dust.</p> <p>iv) Covered conveyor belts are provided for local transportation to eliminate fugitive dust.</p>
xii	Fly ash shall be collected in dry form and storage facility (silos) shall be provided. 100% fly ash utilized shall be ensured as per fly ash notification of MoEF, Govt. of India. Unutilized fly ash and bottom ash shall be stored in the ash pond separately through high concentration slurry disposal method. Mercury levels along with other heavy metals (Pb, Cr, As, etc.) should be mentioned in the fly ash / bottom ash, leachates and effluents emanating from the ash pond.	100 % fly ash is utilized in our cement plant. Bottom ash is stored in silo and being utilized as raw material in cement manufacturing.
xiii	The ash pond should be constructed with impervious lining and ash pond embankment should be stone pitched.	As 100% fly ash utilized for our CPP, it does not have any requirement of ash pond, in our system.
xiv	The treated effluents conforming to the prescribed standards shall be re-circulated and reused within the plant. There shall be no discharge outside the plant boundary. Arrangements shall be made so that effluents and storm water do not get mixed.	The effluent after treatment conforms to the prescribed norms. We ensure 'zero' discharge by re-circulating and reusing the treated water. Care is being taken to elude any mixing of effluent with storm water.
xv	A sewage treatment plant shall be provided and the treated sewage shall be used for raising greenbelt/ plantation.	Sewage treatment plant (STP) is under operation and treated sewage water is used for greenbelt development / plantation.
xvi	Rainwater harvesting should be adopted. Central Groundwater Authority / Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of clearance and details shall be furnished to the SEIAA, Orissa.	Complied and rain water harvesting pond has been made followed by storm water collection in CPP area.
xvii	Adequate safety measures shall be provided in the LDO and / HFO / LSHS shall be made in the plant area to check / minimize spontaneous fires in coal yard, especially during summer season. Details of these measures to be taken along with location plant layout shall be submitted to the SEIAA, Orissa.	Adequate measures have been taken.
xviii	Storage facilities for auxiliary liquid fuel such as LDO and /HFO / LSHS shall be made in the plant area where risk is minimum. On site and off site Disaster	Complied with the condition, as specified and also in terms of the guidelines under the Explosives Rules, 2008.

	Management plans shall be prepared to meet any eventuality in case of an accident taking place. Mock drills shall be conducted regularly and based on the same, modification required if any, shall be incorporated in the Disaster Management plan (DMP). Sulfur content in the liquid fuel will not exceed 0.5%.																																					
xix	Regular monitoring of ground water in and around the ash pond shall be carried out, records maintained and half yearly reports shall be furnished to the SEIAA, Orissa	Not applicable, as we do not require ash pond. Since, fly ash is stored in the fly ash silo and gets utilized for cement plant.																																				
xx	A GREEN BELT of adequate width and density preferably with local species along the periphery of the plant & alongside roads, etc. shall be raised so as to provide protection against particulates and noise. It must be ensured that at least 33% of the total land area shall be under permanent green belt throughout the year & for this purpose they may engage professionals in this field for creation and maintenance of the green belt. An action plan for this purpose shall be prepared accordingly and submitted to the SEIAA, Orissa.	<p>Complied. Plantation update till Sept., 2017. Total area covered under green belt is in &amp; around our Cement &amp; CPP area is 97 ha., Statistical data is given here under:</p> <table border="1"> <thead> <tr> <th colspan="3">DETAILS OF YEAR WISE PLANTATION</th> </tr> <tr> <th>YEAR</th> <th>NO. TREES PLANTED</th> <th>REMARKS</th> </tr> </thead> <tbody> <tr> <td>Up to march, FY:2007-08</td> <td>148655</td> <td>Plantation &amp; sapling distributed</td> </tr> <tr> <td>2008-2009</td> <td>155155</td> <td>2300</td> </tr> <tr> <td>2009-2010</td> <td>162401</td> <td>4800</td> </tr> <tr> <td>2010-2011</td> <td>171757</td> <td>6964</td> </tr> <tr> <td>2011-2012</td> <td>177957</td> <td>9964</td> </tr> <tr> <td>2012-2013</td> <td>183957</td> <td>14164</td> </tr> <tr> <td>2013-2014</td> <td>190246</td> <td>19664</td> </tr> <tr> <td>2014-2015</td> <td>196660</td> <td>27664</td> </tr> <tr> <td>2015-2016</td> <td>203892</td> <td>92664</td> </tr> <tr> <td>2016-2017 (till Sept'17)</td> <td>220900</td> <td>138922</td> </tr> </tbody> </table>	DETAILS OF YEAR WISE PLANTATION			YEAR	NO. TREES PLANTED	REMARKS	Up to march, FY:2007-08	148655	Plantation & sapling distributed	2008-2009	155155	2300	2009-2010	162401	4800	2010-2011	171757	6964	2011-2012	177957	9964	2012-2013	183957	14164	2013-2014	190246	19664	2014-2015	196660	27664	2015-2016	203892	92664	2016-2017 (till Sept'17)	220900	138922
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xxi	First aid and sanitation arrangements shall be made for the drives and other contract workers during construction phase.	Complied																																				
xxii	Noise levels emanating from turbines and air compressors shall be limited to 75 dB (A); for people working in the high noise area, requisite personal protective equipment's like earplugs / ear muffs etc. shall be provided. Workers engaged in noisy areas such as turbine area, air compressors etc. shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non-noisy / less noisy areas.	<p>Noise level is maintained within the permissible limit.</p> <p>People working in the noisy area are provided with ear muff &amp; required PPE.</p>																																				
xxiii	Regular monitoring of ground level concentration of SO <sub>2</sub> , NO <sub>x</sub> , RSPM (PM <sub>10</sub> & PM <sub>2.5</sub> ) etc. shall be	Regular monitoring of SO <sub>2</sub> , NO <sub>x</sub> , RSPM (PM <sub>10</sub> & PM <sub>2.5</sub> ) etc. is being carried out as per guidelines																																				

	carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequently of monitoring shall be decided in consultation with SPCB, Orissa	of SPCB by an em-paneled accredited agency. Monitoring results are enclosed as Annexure-I. Also, online monitoring through CEMS and CAAQMS are in place for regular transmission of data to CPCB and SPCB.
xxiv	Provision shall be made for housing of constructing labours within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Proper care is been ensured to take care about Labour management during project work.
xxv	A separate environment management cell with qualified staff shall be set up for implementation of the stipulated environmental safeguards.	Environment cells have already been formed for implementation of environmental safeguards.
xxvi	Half yearly report on the status of implementation of the stipulated conditions and environmental safeguards shall be submitted to the appropriate authorities.	Reports are being submitted in regular basis.
xxvii	Separate fund shall be allocated for implementation of environmental protection measures along with item-wise break- up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported.	Earmarked funds have allocated for implementation of environmental protection measures.
xxviii	The need of the local people should be appropriately addresses in the CSR activities to be undertaken by the project proponent in the area. An action plan in this regard should be prepared and submitted to SEIAA, Orissa.	Action plan with implementation are undertaken under CSR activities.
xxix	The above mentioned stipulated conditions shall be complied in time bound manner. Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract under the provisions of Environmental Protection (EP) Act, 1986.	Comply with the stipulated conditions, as per E.P.Act, 1986.



# Cleenviron Private Limited

OPCB Empanelled Consultant and Engineers in Environmental Pollution Control & Monitoring with Accredited Laboratory.

## TEST REPORT FOR STACK EMISSION MONITORING

FORMAT NO: CPL/FM/42

REPORT NO: CPL/R/SE/JUL-17/4

REPORT ISSUE DATE: 05.07.2017

SAMPLE DRAWN BY CLEENVIRON PRIVATE LIMITED

Name of the Customer : **OCL INDIA LIMITED**  
 Address of the Customer : **CPP DIVISION, AT/PO: RAJGANGPUR - 770017, SUNDARGARH, ODISHA**

Sample ID No : **CPL/SE/JUN-17/38**  
 Name of Stack Monitored : **Boiler - 2**  
 Stack Connected To : **ESP**  
 Shape of Stack : **Square**  
 Date of Sampling : **29.06.2017**  
 Time of Sampling : **15.50 Hrs**  
 Method of Sampling : **IS 11255 (Part - 1) & (Part - 2) : 1985**  
 Sample Received on : **29.06.2017**  
 Date of Test : **30.06.2017**

Ambient Temperature in °C : **29**  
 Stack Temperature in °C : **107**  
 Average Stack Gas Velocity in m/sec : **11.70**  
 Iso-kinetic Flow Rate in LPM : **17**  
 Duration of Sampling in minute : **40**

**Particulate Matter Concentration** : **25 mg/Nm<sup>3</sup>**  
**Emission Limit Prescribed by OPCB** : **50 mg/Nm<sup>3</sup>**  
**Sulphur Dioxide as SO<sub>2</sub>** : **23.19 mg/Nm<sup>3</sup>**  
**Nitrogen Oxides as NO<sub>x</sub>** : **162.32mg/Nm<sup>3</sup>**

*[Signature]*  
 Subhanga Praharaj  
 Managing Director/C&E

*[Signature]*  
 Verified By

*[Signature]*  
 Test Done By



END OF TEST REPORT

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# Cleenviron Private Limited

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## TEST REPORT FOR STACK EMISSION MONITORING

FORMAT NO: CPL/FM42

REPORT NO: CPL/R/SE/SEPT-17/40

REPORT ISSUE DATE: 20.09.2017

SAMPLE DRAWN BY CLEENVIRON PRIVATE LIMITED

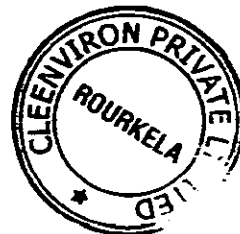
Name of the Customer : **OCL INDIA LIMITED**  
 Address of the Customer : **CEMENT DIVISION, AT/PO: RAJGANGPUR - 770017, SUNDARGARH, ODISHA**  
 Sample ID No : **CPL/SE/SEPT-17/25**  
 Name of Stack Monitored : **CPP, Boiler - 2**  
 Stack Connected To : **ESP Outlet**  
 Shape of Stack : **Square**  
 Date of Sampling : **16.09.2017**  
 Time of Sampling : **12.20 Hrs**  
 Method of Sampling : **IS 11255 (Part - 1), (Part - 2) : 1985 & (Part - 7) : 2005**  
 Sample Received on : **16.09.2017**  
 Date of Test : **18.09.2017**

Ambient Temperature in °C : **41**  
 Stack Temperature in °C : **135**  
 Average Stack Gas Velocity in m/sec : **14.72**  
 Iso-kinetic Flow Rate in LPM : **20**  
 Duration of Sampling in minute : **20**

Particulate Matter Concentration : **07 mg/Nm<sup>3</sup>**  
 Emission Limit Prescribed by OPCB : **50 mg/Nm<sup>3</sup>**  
 Sulphur Dioxide as SO<sub>2</sub> : **62.92 mg/Nm<sup>3</sup>**  
 Nitrogen Dioxide as NO<sub>2</sub> : **164.8mg/Nm<sup>3</sup>**

  
 Subhanga Prharaj  
 Managing Director/CM

  
 Verified By



  
 Test Done By

— END OF TEST REPORT —

Page 1 of 1

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# Cleenviron Private Limited

OPCB Empanelled Consultant and Engineers in Environmental Pollution Control & Monitoring with Accredited Laboratory.

## TEST REPORT FOR STACK EMISSION MONITORING

FORMAT NO: CPL/FM/42

REPORT NO: CPL/R/SE/SEPT-17/39

REPORT ISSUE DATE: 20.09.2017

SAMPLE DRAWN BY CLEENVIRON PRIVATE LIMITED

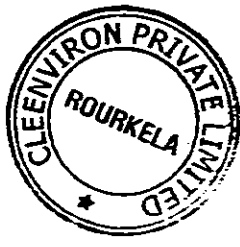
Name of the Customer	:	<b>OCL INDIA LIMITED</b>
Address of the Customer	:	CEMENT DIVISION, AT/PO: RAJGANGPUR - 770017, SUNDARGARH, ODISHA
Sample ID No	:	<b>CPL/SE/SEPT-17/24</b>
Name of Stack Monitored	:	CPP, Boiler - 1
Stack Connected To	:	ESP
Shape of Stack	:	Square
Date of Sampling	:	16.09.2017
Time of Sampling	:	10.45 Hrs
Method of Sampling	:	IS 11255 (Part - 1), (Part - 2) : 1985 & (Part - 7) : 2005
Sample Received on	:	16.09.2017
Date of Test	:	18.09.2017

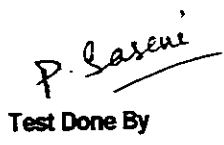
Ambient Temperature in °C	:	38
Stack Temperature in °C	:	126
Average Stack Gas Velocity in m/sec	:	15.40
Iso-kinetic Flow Rate in LPM	:	22
Duration of Sampling in minute	:	45

Particulate Matter Concentration	:	27 mg/Nm <sup>3</sup>
Emission Limit Prescribed by OPCB	:	50 mg/Nm <sup>3</sup>
Sulphur Dioxide as SO <sub>2</sub>	:	31.80 mg/Nm <sup>3</sup>
Nitrogen Dioxide as NO <sub>2</sub>	:	131.5mg/Nm <sup>3</sup>

  
**Subhanga Praharaj**  
 Managing Director/QM

  
 Verified By



  
 Test Done By

— END OF TEST REPORT —

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# **ENVIRONMENTAL MONITORING REPORT**

BASED ON DATA GENERATED

FROM

**APRIL 2017 – SEPTEMBER 2017**

FOR

**OCL INDIA LIMITED**

At/Po: RAJGANGPUR, District: SUNDARGARH, ODISHA

AT

**CEMENT PLANT(LINE – 1 & LINE - 2)  
AND  
CAPTIVE POWER PLANT**

Prepared By:

**Cleenviron Private Limited**

D-124, KOELNAGAR, ROURKELA, ODISHA

Tele fax: 0661 – 2475746

Email: [cleenviron@gmail.com](mailto:cleenviron@gmail.com)

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## 1. INTRODUCTION

**OCL** is currently manufacturing Ordinary Portland Cement (OPC) of various grades including grade 53S specially meant for concrete sleepers for railways, Portland Slag Cement (PSC), flyash based Portland Pozzolana Cement (PPC), Sulphate Resistant Portland Cement (SRPC) and Oil well cement. The main raw materials used for manufacturing of various types of cement are Clinker, Slag, Flyash and Gypsum. Clinker is the main raw material, which is produced by sintering limestone along with other additives like clay, morrum, char, cinder etc. Coal is used as fuel for burning the limestone in kiln.

**Cement Division of OCL India Limited (OCL)** is currently operating a cement plant located at Rajgangpur in Sundargarh district of Odisha state. The existing plant has production capacity of 2.9 million tonnes clinker per annum and cement manufacturing capacity 4 million tonnes cement per annum.

The limestone requirement for the proposed expansion is proposed to be met by the increased production from the existing captive mines at Lanjiberna.

## 2. LOCATION AND ACCESSIBILITY

The proposed site is well within the existing factory premises of **OCL** at Rajgangpur and has the following coordinates (as per Survey of India toposheet no. 73 B/12, scale 1:50000):

- Latitude : 22° 12' N
- Longitude : 84° 35' E

The area covered by **OCL** comes under Rajgangpur village of Tehsil Rajgangpur, district Sundargarh. The general elevation of land is about 250 m above mean sea level. Accessibility to the site is as per details given below:

### Road

The plant is located about 43 km from Rourkela on Rourkela-Sambalpur state highway (SH-10).

### Rail

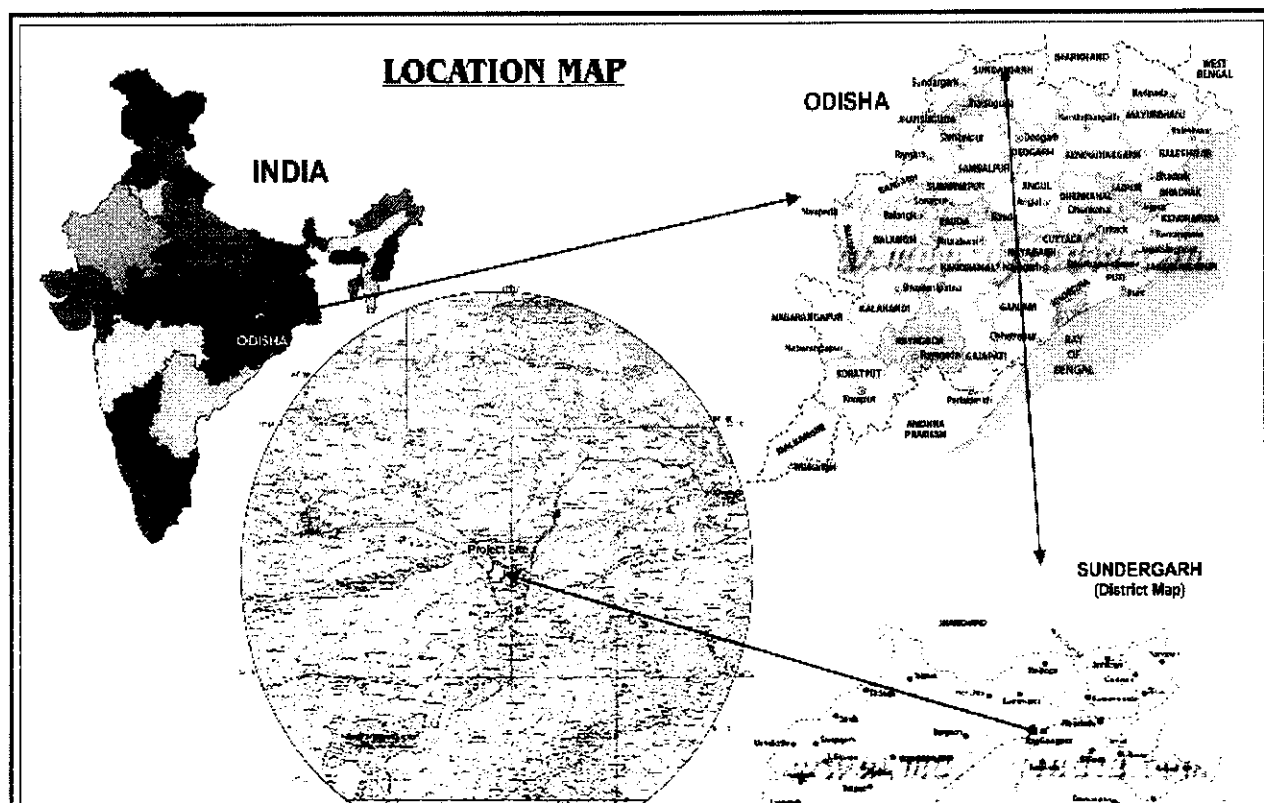
The nearest railway station is at Rajgangpur, which is about 2 km from the plant site and is located on the Howrah-Mumbai section of South Eastern Railway.

### Air

The nearest airport is at Kolkatta, which is about 450 km from plant site and well connected by rail and road.

The location of the project site is depicted as in **Figure1.1**

Figure No: 1.1



OCL has affianced *Cleenviron Private Limited (NABL accredited Laboratory)*, Rourkela, Odisha, to carry out periodical environmental monitoring and to prepare Environment monitoring report. The study has been carried out as per the guidelines of Ministry of Environment & Forests (MOEF) and State Pollution Control Board, Odisha (SPCB).

### 3. ASPECTS CONSIDERED FOR ENVIRONMENTAL MONITORING

This report is based on the monitoring results generated from April 2017 to September 2017 covering post-monsoon and winter seasons of the year. Ambient Air Quality and Stack Emission monitoring was carried out on Quarterly once basis.

- i. Micro-meteorological Monitoring
- ii. Ambient Air Quality Monitoring
- iii. Stack Emission Monitoring

Monitoring of environmental parameters for collection of data involves field work, which is described below:

#### 3.1 Micro-meteorological Study

For collection of micro-meteorological data like Temperature, Relative Humidity, Wind Speed, Wind Direction, & Rainfall, a weather monitoring station is fixed on the Magazine Hill Top of Lanjiberna Limestone and Dolomite Mines of M/s OCL India Ltd. Hourly data is being recorded continuously by putting up windows compatible data logging facility instrument, Make: Virtual Electronics Company, Roorkee.

### **3.2 Ambient Air Monitoring**

To assess ambient air quality, total 7 (seven) monitoring stations are fixed including 5 (five) in the Line - 1 and 2 (two) in the Line - 2. The monitoring locations are fixed according to the micro-meteorological data and in consultation with State Pollution Control Board. The monitoring was carried out for parameters like PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub>, O<sub>3</sub>, CO, As, Ni, Pb, Benzene & Benzo(a)pyrene and monitoring was carried out once during three months from each location. For collection of samples Respirable Dust sampler with PM<sub>2.5</sub> attachment was placed at each location, sampling and analytical techniques are followed as per the standard methods of ambient air sampling and analysis.

### **3.3 Stack Emission Monitoring**

The essential units of the cement plant are equipped with pollution control equipments. To assess the emission level of Particulate Matter from the stacks of different units, monitoring of Stack emission levels were scheduled on quarterly once basis. Particulate Matter emission was monitored following the BIS methods for Stack monitoring.

## **4. SAMPLING LOCATIONS**

### **4.1 Micro-Meteorological Study**

One meteorological station was set up on the Magazine Hill Top of the Lanjiberna Limestone & Dolomite Mines to monitor wind speed, wind direction, temperature, relative humidity and rainfall on hourly basis by data logging technique. The station is at an aerial distance of around 8 kms from the project site.

### **4.2 Ambient Air Quality Monitoring**

Five ambient air quality monitoring stations are fixed within the Line -1 and two stations are fixed in the Line – 2 area. General precautions were taken to position the Respirable Dust Samplers at all the locations. The descriptions of the Ambient Air Monitoring Stations are as follows:

#### **A-1 Stores Building (Line – 1):**

The sampling station is located within the Plant site and the station was selected to assess the present level of pollution due to the general unit operations of the Line - 1.

#### **A-2 DITC Building Near Line - 2:**

This location is nearer to the Line – 2 operational area. This was selected to assess the air quality in and around the Line – 2 unit operations.

#### **A-3 Near Canteen Building (Line – 1):**

The sampling station is located within the Plant site and the station was selected to assess the present level of pollution due to the general unit operations of the Line - 1.

#### **A-4 Near Loco Gate (Line – 1):**

The sampling station is located within the Plant site and the station was selected to assess the present level of pollution due to the general unit operations of the Line - 1.

#### **A-5 CCR Building (Line – 1):**



The sampling station is located within the Plant site and the station was selected to assess the present level of pollution due to the general unit operations of the Line - 1.

**A-6 Workshop Building (Line – 1):**

The sampling station is located within the Plant site and the station was selected to assess the present level of pollution due to the general unit operations of the Line - 1.

**A-7 Near Water Harvesting Area of CPP (Line – 2):**

This location is within the Line – 2 operational area. This was selected to assess the air quality in and around the Line – 2 unit operations.

**4.3 Stack Emission Monitoring:**

The stack of the different units of the Cement plant like, VRM – Line – 1, CVRM – 1, CVRM – 2, CVRM – 3, RABH Line – 2, Bolier – 1, Boiler – 2, Coal Mill Line – 1, Coal Mill Line – 2, Cooler Line – 2, were carried out for parameters like, Particulate Matter, Sulphur Dioxide and Nitrogen Oxides emission levels.

## **5. METHODOLOGY OF SAMPLING & ANALYTICAL PROCEDURES**

### **5.1 Meteorological Study**

For recording various meteorological parameters like, Temperature, RH, Wind Speed, Wind Direction & Rainfall, a weather monitoring station, Make: Virtual Electronics Company, Roorkee was installed at the site. The instrument is equipped with windows based data logging software to store each data on hourly basis, which can be further down loaded to a PC and data can be interpreted as per the requirement of the report.

### **5.2 Ambient Air Monitoring**

Air quality samples were monitored for all parameters as per NAAQS. For sampling and analysis, methods prescribed by CPCB were followed and Respirable Dust Samplers (RDS) APM 460BL – 411TE, Make: Envirotech Instruments Pvt. Ltd. were used and for PM<sub>2.5</sub> sampling AAS 190 attachment for fine particulate sampling along with RDS was used where ever necessary at the site.

### **5.3 Stack Monitoring**

Stack monitoring were carried out once in every three months from the bag filter and ESP outlet stacks of the units mentioned and the Indian standard methods for monitoring of Stack emission was followed for collecting the sample and the concentration of Particulate Matter were calculated by following the standard methods. For collection of sample Ecotech Instruments make Stack sampler Model: ESS -100 was used at the site.

## **6. DATA ANALYSIS**

### **6.1 Micro-meteorological Study:**

#### **6.1.1 Wind Speed & Wind Direction**

During the entire period from 1<sup>st</sup> April to 30<sup>th</sup> September all total 4387 no. of data are recorded by the instrument and after interpretation of the collected data it was found that Calm condition prevailed over 38.55%, while considering the 24 hourly data. 29.14% calm condition prevailed from morning 6 hrs to 14hrs for the entire study period, 41.45% calm condition prevailed from 14hrs to 22hrs and 46.26% calm condition

prevailed from 22hrs to 06hrs. The predominant wind directions were from East, SE & NW with average wind speed 1.48 m/sec. The wind rose diagram for the entire study period are depicted on the **Figure No: 6.1, 6.2, 6.3 & 6.4.**

### 6.1.2 Temperature

The maximum & minimum temperature during the entire study period were divided in to two parts as the study period was covering summer as well as monsoon seasons. The Minimum temperature during the summer season was found to be 22.8°C and the Maximum temperature was found to be 45.3°C up to the end of 30<sup>th</sup> June.

The minimum and maximum temperature during the monsoon season i.e. from July to September was found to be 20.8°C and 36.3°C. **Table No 6.1** shows a summary of micro-meteorological data collected for the entire period.

### 6.1.3 Rainfall

The total rain fall from 1<sup>st</sup> April to 30<sup>th</sup> September was observed to be 679.6 mm. during the study period. A month wise rainfall data recorded at the site is depicted in **Table No 6.1.**

**Table No: 6.1**  
**A Summary of the Micro-meteorological Data**

**Project Ref. Site : OCL Limestone & Dolomite Mines**

<b>Sl No</b>	<b>Parameters</b>	<b>From April – September 2017</b>
1	Predominant Wind Direction	From East, SE & NW
2	Calm Condition %	38.55
3	Average Wind Speed m/sec	1.48
4	Temperature °C	
	<b>Summer Season</b>	
	Minimum	22.84
	Maximum	45.31
	<b>Monsoon Season</b>	
	Minimum	20.8
	Maximum	36.3
5	<b>Rain Fall in mm</b>	
	April	2.4
	May	18.2
	June	157.2
	July	250.6
	August	148.6
	September	102.6
	<b>Total</b>	<b>679.6</b>

Figure No: 6.1

Wind Rose Diagram for 24 Hours

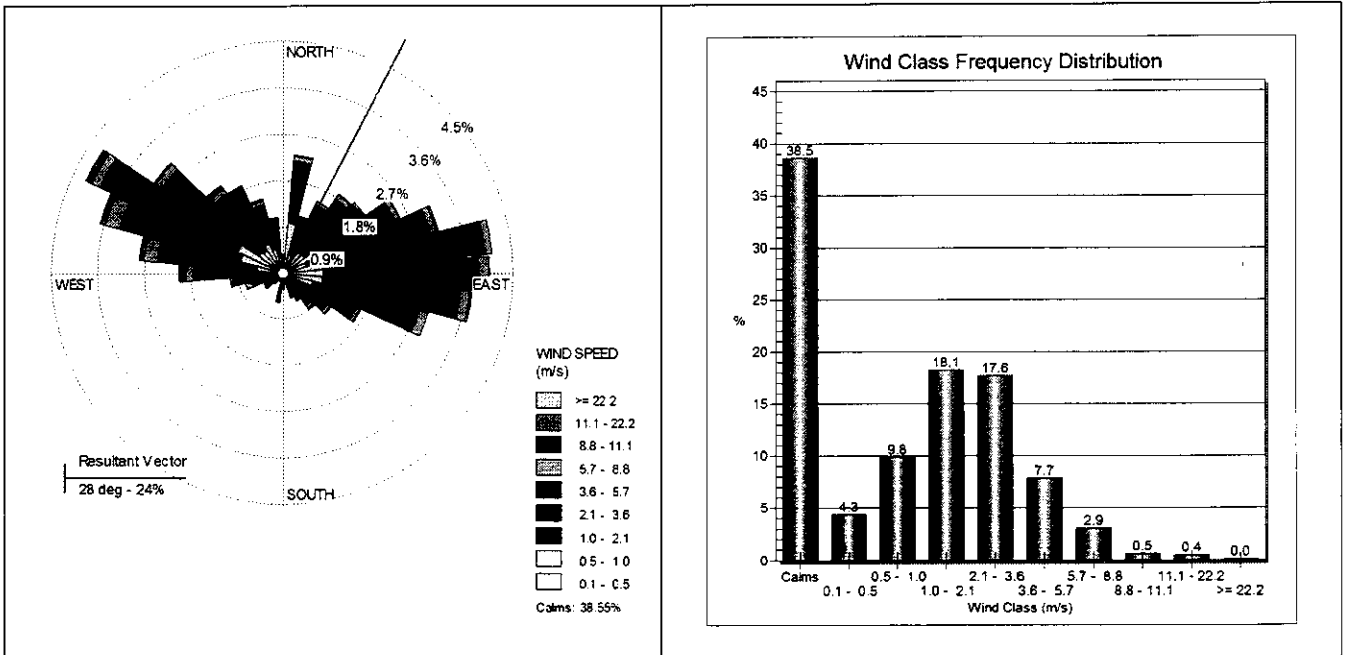


Figure No: 6.2

Wind Rose Diagram from 06 – 14 Hours

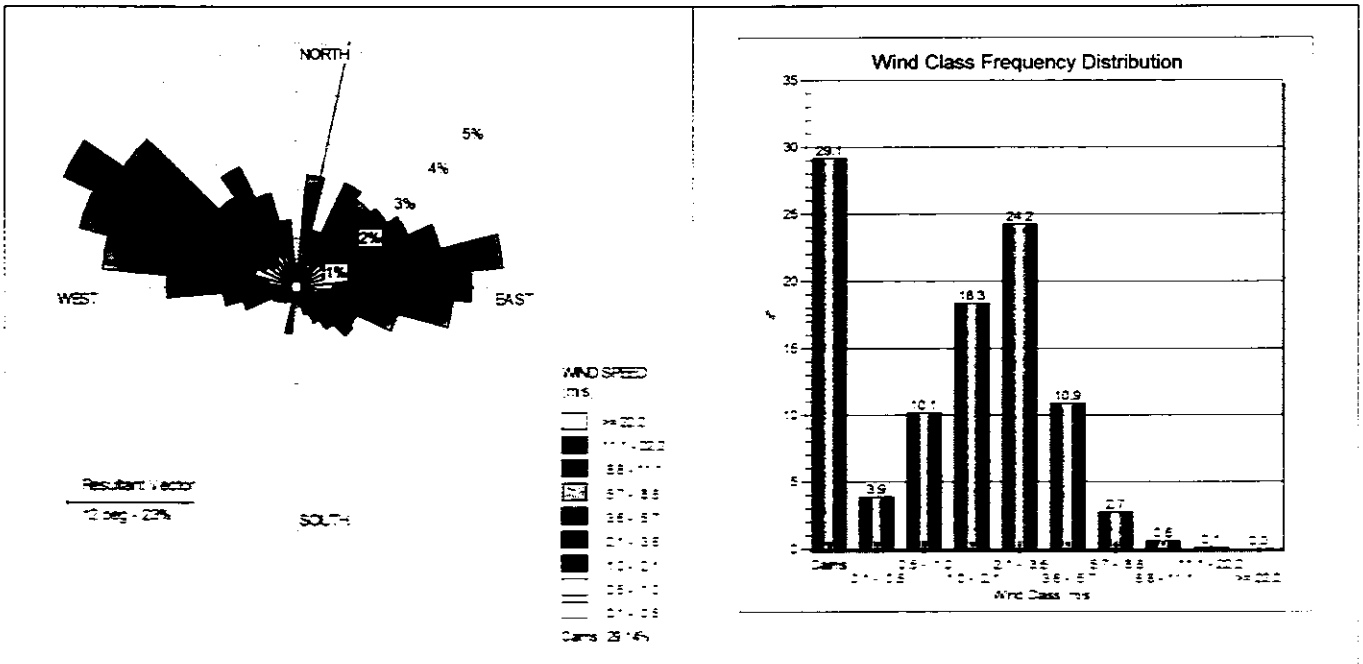


Figure No: 6.3

Wind Rose Diagram from 14 – 22 Hours

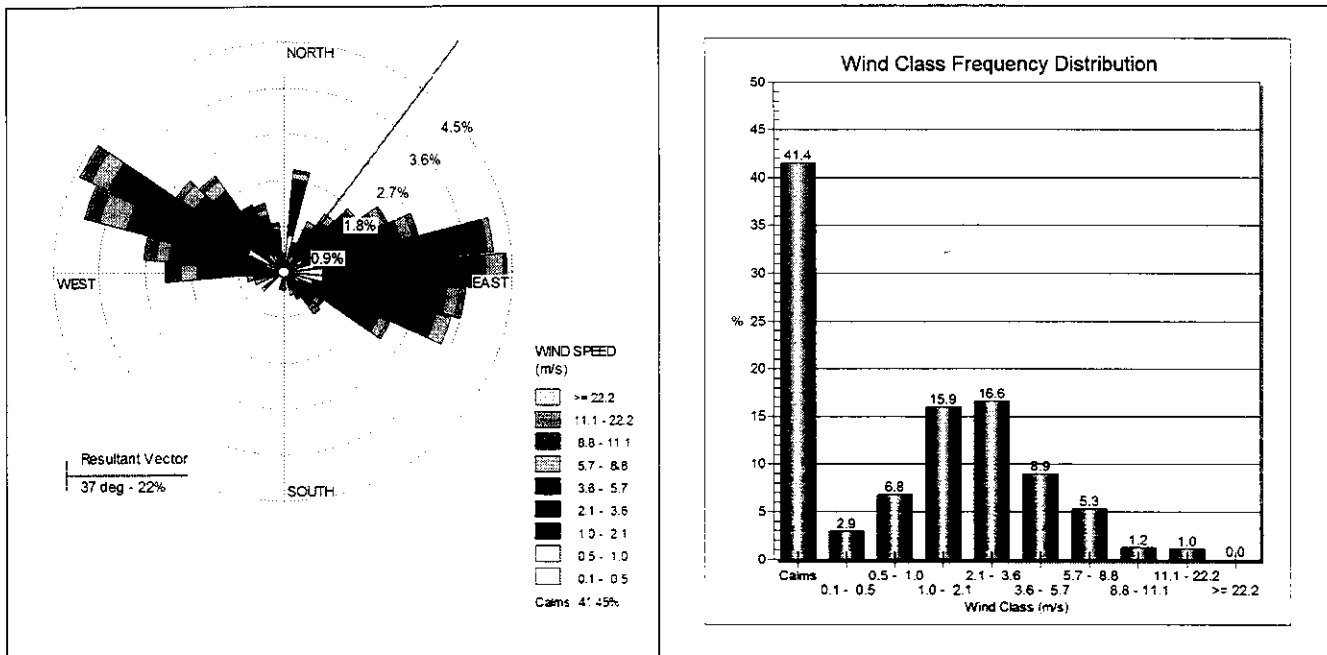
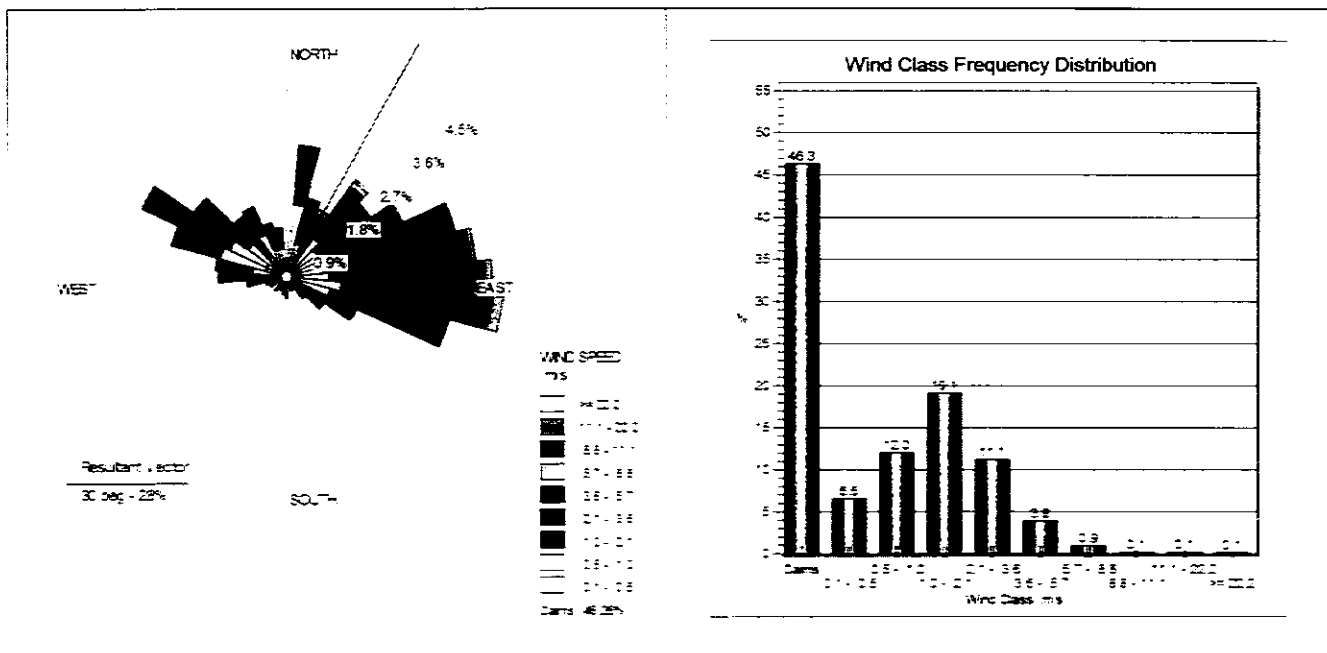


Figure No: 6.4

Wind Rose Diagram from 22 – 06 Hours



**Table No: 6.2**  
**AMBIENT AIR QUALITY DATA**  
 From 01.04.2017 to 30.09.2017  
 Station: A-1 Stores Building (Line – 1)

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>x</sub>
28.06.2017	30	90	03	12
13.09.2017	19	49	< 3	12

Table No: 6.2A

Sl No	Date of Sampling	Parameters							
		NH <sub>3</sub>	O <sub>3</sub>	Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzen e (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase
Units		µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis		APWA 3 <sup>rd</sup> Ed. Method - 401	APWA 3 <sup>rd</sup> Ed. Method - 411	APWA 3 <sup>rd</sup> Ed. Method - 822	APWA 3 <sup>rd</sup> Ed. Method - 804	APWA 3 <sup>rd</sup> Ed. Method - 822	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	28.06.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
2.	13.09.2017	23	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1

Table No: 6.3  
**AMBIENT AIR QUALITY DATA**  
 From 01.04.2017 to 30.09.2017  
 Station: A-2 DITC Building Near Line - 2

Date	PM2.5	PM10	SO <sub>2</sub>	NOx
30.06.2017	21	82	< 3	< 6
16.09.2017	23	65	< 3	06

Table No: 6.3A

Sl No	Date of Sampling	Parameters							
		NH <sub>3</sub>	O <sub>3</sub>	Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzen e (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase
Units		µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis		APWA 3 <sup>rd</sup> Ed. Method - 401	APWA 3 <sup>rd</sup> Ed. Method - 411	APWA 3 <sup>rd</sup> Ed. Method - 822	APWA 3 <sup>rd</sup> Ed. Method - 804	APWA 3 <sup>rd</sup> Ed. Method - 822	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	30.06.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	0.60	< 0.1
2.	16.09.2017	21	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1

Table No: 6.4  
**AMBIENT AIR QUALITY DATA**  
 From 01.04.2017 to 30.09.2017  
 Station: A-3 Near Canteen Building (Line - 1)

Date	PM2.5	PM10	SO <sub>2</sub>	NOx
28.06.2017	33	80	03	12
14.09.2017	23	60	< 3	< 6

**Table No: 6.4A**

Sl No	Date of Sampling	Parameters							
		NH <sub>3</sub>	O <sub>3</sub>	Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzen e (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) - Particulate Phase
Units		µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis		APWA 3 <sup>rd</sup> Ed. Method - 401	APWA 3 <sup>rd</sup> Ed. Method - 411	APWA 3 <sup>rd</sup> Ed. Method - 822	APWA 3 <sup>rd</sup> Ed. Method - 804	APWA 3 <sup>rd</sup> Ed. Method - 822	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	28.06.2017	< 20	< 19.6	< 0.40	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
2.	14.09.2017	< 20	< 19.6	< 0.40	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1

**Table No: 6.5**  
**AMBIENT AIR QUALITY DATA**  
 From 01.04.2017 to 30.09.2017  
 Station: A-4 Near Loco Gate (Line - 1)

Date	PM2.5	PM10	SO <sub>2</sub>	NOx
28.06.2017	33	78	03	09
14.09.2017	25	73	< 3	06

**Table No: 6.5A**

Sl No	Date of Sampling	Parameters							
		NH <sub>3</sub>	O <sub>3</sub>	Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzen e (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) - Particulate Phase
Units		µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis		APWA 3 <sup>rd</sup> Ed. Method - 401	APWA 3 <sup>rd</sup> Ed. Method - 411	APWA 3 <sup>rd</sup> Ed. Method - 822	APWA 3 <sup>rd</sup> Ed. Method - 804	APWA 3 <sup>rd</sup> Ed. Method - 822	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	28.06.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
2.	14.09.2017	20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1

**Table No: 6.6**  
**AMBIENT AIR QUALITY DATA**  
 From 01.04.2017 to 30.09.2017  
 Station: A-5 CCR Building (Line - 1)

Date	PM2.5	PM10	SO <sub>2</sub>	NOx
29.06.2017	34	79	< 3	22
15.09.2017	23	76	< 3	< 6

**Table No: 6.6A**

Sl No	Date of Sampling	Parameters							
		NH <sub>3</sub>	O <sub>3</sub>	Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzen e (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase
Units		µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis		APWA 3 <sup>rd</sup> Ed. Method - 401	APWA 3 <sup>rd</sup> Ed. Method - 411	APWA 3 <sup>rd</sup> Ed. Method - 822	APWA 3 <sup>rd</sup> Ed. Method - 804	APWA 3 <sup>rd</sup> Ed. Method - 822	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	29.06.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
2.	15.09.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1

**Table No: 6.7**  
**AMBIENT AIR QUALITY DATA**  
 From 01.04.2017 to 30.09.2017  
 Station: A-6 Workshop Building (Line - 1)

Date	PM2.5	PM10	SO <sub>2</sub>	NOx
29.06.2017	25	70	03	25
15.09.2017	22	59	< 3	08

**Table No: 6.7A**

Sl No	Date of Sampling	Parameters							
		NH <sub>3</sub>	O <sub>3</sub>	Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzen e (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase
Units		µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis		APWA 3 <sup>rd</sup> Ed. Method - 401	APWA 3 <sup>rd</sup> Ed. Method - 411	APWA 3 <sup>rd</sup> Ed. Method - 822	APWA 3 <sup>rd</sup> Ed. Method - 804	APWA 3 <sup>rd</sup> Ed. Method - 822	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	29.06.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
2.	15.09.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1

**Table No: 6.8**  
**AMBIENT AIR QUALITY DATA**  
 From 01.04.2017 to 30.09.2017  
 Station: A-7 Near Water Harvesting Area of CPP (Line - 2)

Date	PM2.5	PM10	SO <sub>2</sub>	NOx
29.06.2017	39	82	< 3	47
15.09.2017	25	73	< 3	06

**Table No: 6.8A**

Sl No	Date of Sampling	Parameters							
		NH <sub>3</sub>	O <sub>3</sub>	Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzen e (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase
Units		µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis		APWA 3 <sup>rd</sup> Ed. Method - 401	APWA 3 <sup>rd</sup> Ed. Method - 411	APWA 3 <sup>rd</sup> Ed. Method - 822	APWA 3 <sup>rd</sup> Ed. Method - 804	APWA 3 <sup>rd</sup> Ed. Method - 822	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	29.06.2017	32	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
2.	15.09.2017	< 20	< 19.6	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1

## 6.2 Stack Emission Monitoring

The Quarterly monitoring results of stack emission from the different units of the Cement Plant are given below:

**Table No 6.9: Stack Emission Monitoring Results**

SI No	Location	Particulate Matter Concentration in mg/Nm <sup>3</sup>	
		June 2017	September 2017
1	Coal Mill, Line - 2	10	08
2	RABH Kiln, Line - 2	15	06
3	Cooler, Line - 2	23	16
4	CVRM - 2, Line - 1	17	07
5	CVRM - 3, Line - 1	25	07
6	CVRM - 1, Line - 1	16	03
7	Boiler - 2 Outlet ESP	25	07
8	Boiler - 1 Outlet ESP	21	27
9	VRM, Line - 1	28	26
10	Coal Mill, Line - 1	07	06
11	Cooler, Line - 1	13	04

## 7. CONCLUSION

### 7.1 Ambient Air Quality

It is concluded from the above study that the overall ambient air quality of the Cement Plant, both Line -1 and Line - 2 of OCL India Ltd. is good and the action taken by the plant authority were quite satisfactory.

### 7.2 Stack Emission Monitoring

The stack emission monitoring results of all control equipments monitored is very much effective and results are all within the prescribed standards by the State Pollution Control Board, Odisha.

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