

Environmental Status Report  
For  
Tatijharia Bauxite Mine  
at  
Post & Teh.: Samri, (Kusmi)  
Dist: Balrampur-Ramanujganj (C.G.)

**Duration: April-May-June-2018**

Name of Industry:-



*Rupambhathi*  
Agent of Mines  
Samri Mines Division  
Hindalco Industries Ltd.

**M/s. Hindalco Industries Limited.,**

Name of Laboratory:-



Recognised by MoEF (GOI) Notifn. No. D.L.33004/99 Dt.24.10.2007  
NABL T-1550 (Chemical), T-1826 (Biological), T-2344 (Mechanical) dt.04/10/2016 valid up to 03.10.2018  
Accredited under the QCI-NABET Scheme for EIA Consultant  
BIS vide No.CL/CQAPD/OSL (7124116) dt.16.12.2011  
Certified by ISO 9001:2008, ISO 14001:2004, ISO 18001:2007  
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## Foreword

The protection of environment plays a crucial role in maintaining the local environment quality for any mining industry. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding the mine area. Therefore, environment protection is becoming a prerequisite for sustainable development. In line with this requirement, the management of **M/s Hindalco Industries Ltd.** has adopted a corporate responsibility of environment protection.

In order to comply with the Environment protection act, to fulfill statutory requirement and to be in tune with Environmental Preservation and sustainable development, **M/s Hindalco Industries Ltd.** has retained **ANACON LABORATORIES PVT. LTD.,** Nagpur as Environment Consultants and for various Environmental issues related to their mines.

This report presents the Environmental Status for the period **April-2018 to June-2018** as compliance to the statutory requirements.

The co-operation extended by the Staff and Management of **M/s Hindalco Industries Ltd.** during the work execution period is gratefully acknowledged.

for ANACON LABORATORIES PVT. LTD.

Place : Nagpur  
Date : June, 2018



A handwritten signature in blue ink, appearing to read "K. K. Kulkarni".

Authorized Signatory





## **1.1 Introduction**

**Hindalco Industries Limited (Hindalco)** is one among the flagship companies of the Aditya Birla Group of Industries and is one of the largest corporate groups in India. This group is a leading manufacturer of Aluminum in India, having integrated facilities encompassing bauxite, mining, refining and smelting to achieve Aluminum.

Various processing units of Hindalco are strategically located in different parts of the nation to achieve optimum benefits. Over the past few decades the group has grown multifold in its production capacities, product mix and diversification in mining. The Chhattisgarh Environment Conservation Board (CECB) granted permission for establishing the Bauxite mine to Hindalco at block Tatijharia, Kudag and Samri mines in Balrampur District of Chhattisgarh State.

**HINDALCO INDUSTRIES LTD.** awarded the work to M/s ANACON LABORATORIES PVT. LTD. NAGPUR (ALPL) for carrying out monitoring of parameters for assessing pollution levels and preparation of monthly report (April-May-June-2018) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment Forest and climate change (MoEFCC) for Tatijharia mining lease in Balrampur District, Chhattisgarh State.

## **1.2 Background Information of Tatijharia Mine**

Hindalco was granted Tatijharia Bauxite mining lease over an area of 1218.762hec.inTatijharia, Post Jamira, Tehsil Samri of Balrampur district, Chhattisgarh on 25/06/1998 for a period of 50 years. The mining operations were started on 01/04/2004. The production capacity of bauxite is 4.0 Lakh Tonnes Per Annum (LTPA).

## **1.3 Salient Features of Tatijharia Bauxite Mine**

The deposits occur in Tatijharia block, Post JamiraTehsil Samri of Balrampur district. This deposit has been identified as one of the resources to cater the raw material requirements of the Hindalco Alumina refinery at Renukoot, Uttar Pradesh. The salient features of the project are presented below: **(Table-1)**



## 1.5 Air Environment

### 1.5.1 Ambient Air Quality Monitoring

Ambient Air Quality monitored at 8 locations in the core zone and buffer zone with reference to Tatijharia mine lease area shown in (Fig. 1).

**Table 2**

**Locations of Ambient Air Quality Monitoring (AAQM) & Fugitive Emission (1218.762 hec.)**

S.No.	Fugitive Emission (Core Zone)	S.No.	Buffer Zone
1	Piprapat/Nr.Mining Area	5	Kutku Village/Nr.V.T.Center
2	Betpani	6	Sairaidh Campus
3	Virhorepat	7	Rajendrapur/Nr.Mining Area
4	Tatijharia Village/Nr.Weigh Bridge	8	Dumerkholi/Nr.Mining Area

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the mining site in the core zone and buffer zone. ALPL is carrying out regular monitoring for  $PM_{2.5}$ , RPM( $PM_{10}$ ),  $SO_2$ ,  $NO_x$  and SPM, RSPM,  $SO_2$ ,  $NO_x$ , Pb, Hg, As and Cr above Ambient Air Quality Monitoring (AAQM) locations. The dust fall rate was measured in the mining area (BKB campus) and Tatijharia village during April to June-2018. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

### 1.5.2 Sampling Duration and Frequency

Ambient air quality monitoring was carried out for the parameters  $PM_{2.5}$ , RPM( $PM_{10}$ ),  $SO_2$ ,  $NO_x$  and SPM, RSPM,  $SO_2$ ,  $NO_x$ , Pb, Hg, As and Cr from January to March-2018 as per CPCB norms. Sampling Frequency is given in **Table-3**.

Data is compared with the present revised standards mentioned in the latest Gazette Notification of the Central Pollution Control Board (CPCB) (August-20, 1994), and as per consent conditions mentioned in consent letter.



**Table 4.0**  
**Measurement Techniques for various pollutants**

Sr. No.	Parameter	Technique	Technical Protocol	Minimum Reportabl Value( $\mu\text{g}/\text{m}^3$ )
1.	Suspended Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part - 23)	5
2.	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
3.	Particulate Matter 2.5	Respirable Dust Sampler (Gravimetric Method)	Gravimetric Method	5
4.	Sulphur Dioxide	Modified West and Gaeke	IS-5182 (Part - II)	4
5.	Oxide of Nitrogen	Jacob & Hochheiser Method	IS-5182 (Part - VI)	4
6.	Pb, As, Hg, Cr	Acid Digestion Method	EPA Method	0.1
7.	Dust Full	Gravimetric	IS-5182 (Part-I)	—

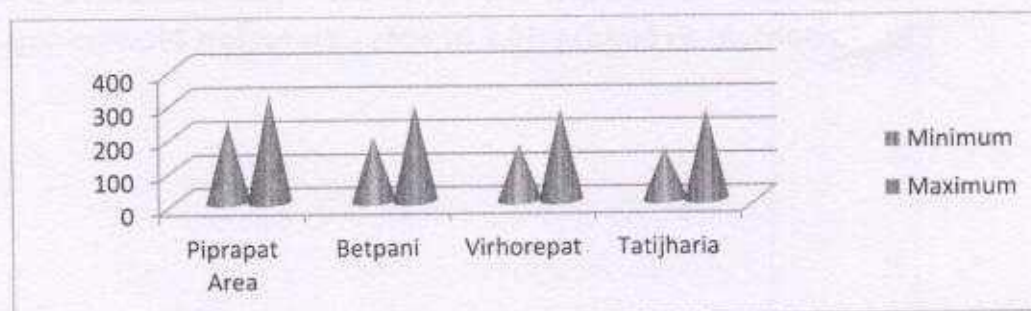
### 1.6 Fugitive Emission Monitoring (Core Zone)

The summary of Fugitive Emission monitoring results for the month of April to June-2018 are presented in detail in **Table 3.0**. 98<sup>th</sup> percentile; maximum and minimum values etc. have been computed from the collected raw data for all the Fugitive monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQS for residential and rural zone.

#### 1.6.1 Presentation of Results

##### Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as  $152\mu\text{g}/\text{m}^3$  and  $320\mu\text{g}/\text{m}^3$  respectively. The average concentrations were ranged between 180 to  $297\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 192 to  $319\mu\text{g}/\text{m}^3$  in the study area (**Table 6**).

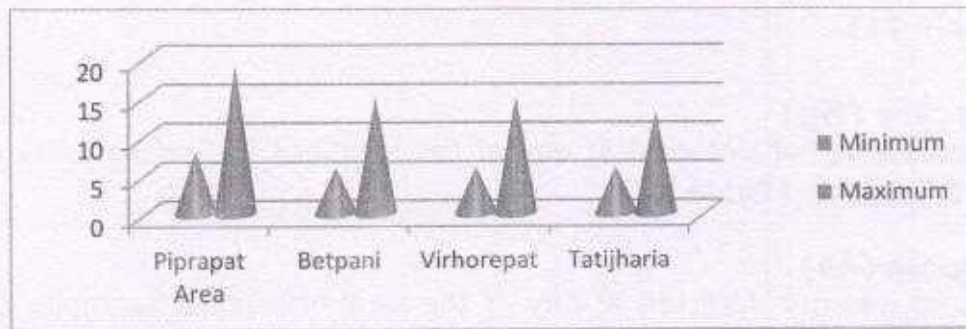


**Fig. Graphical Presentation of SPM Fugitive Emission Monitoring**



### Sulphur Dioxide (SO<sub>2</sub>)

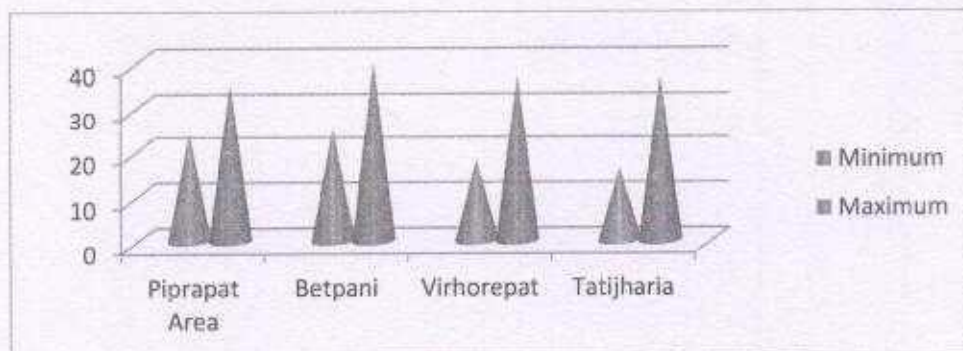
The minimum and maximum SO<sub>2</sub> concentrations were recorded as 6µg/m<sup>3</sup> and 19µg/m<sup>3</sup> respectively. The average values were observed to be in the range of 8 to 16µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 9 to 19µg/m<sup>3</sup> (Table 9).



**Fig. Graphical Presentation of SO<sub>2</sub> Fugitive Emission Monitoring**

### Nitrogen Oxide (NO<sub>x</sub>)

The minimum and maximum NO<sub>x</sub> concentrations were recorded as 16µg/m<sup>3</sup> and 40µg/m<sup>3</sup>. The average concentrations were ranged between 19 to 37µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 21 to 40µg/m<sup>3</sup> (Table 10).



**Fig. Graphical Presentation of NO<sub>x</sub> Fugitive Emission Monitoring**



## 1.7 Ambient Air Quality (Buffer Zone)

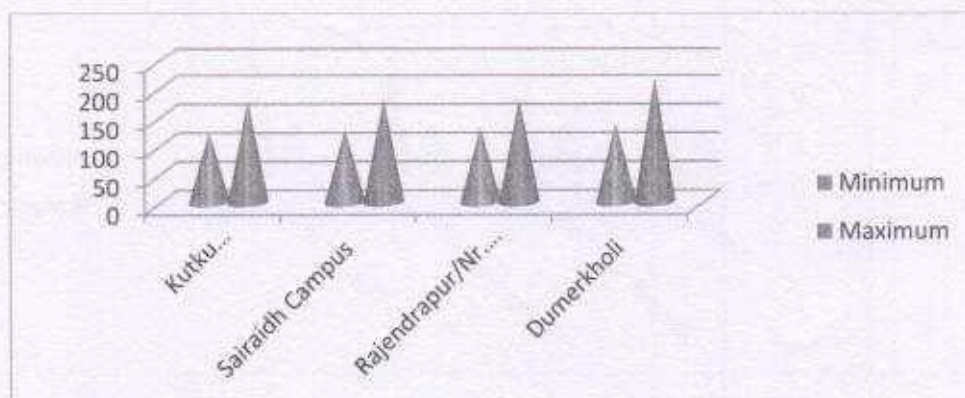
The background levels of SPM, RPM (PM<sub>10</sub>), PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, Pb, Hg, As and Cr measured are required to compute Ambient Air Quality. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, Maximum concentration, Arithmetic mean (AM), Geometric mean (GM) and 98 Percentile are presented in tabular form (**Table 6**).

### 1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month of April to June-2018 are presented in detail in **Table 3**. 98<sup>th</sup> percentile; maximum and minimum values etc. have been computed from the collected raw data for all the AAQ monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQ for residential and rural zone.

#### **Suspended Particulate Matter-SPM**

The statistical analysis of SPM is presented in **Table 6** for the mining area. The minimum and maximum values varied between 124 to 218µg/m<sup>3</sup> respectively during study period at all the 4 locations. The average values ranged between 135 to 173µg/m<sup>3</sup> and 98<sup>th</sup> percentile values ranged between 146 to 182µg/m<sup>3</sup> in the study area.



**Fig. Graphical Presentation of SPM Fugitive Emission Monitoring**





Overall the ambient air concentrations of SPM, PM 10(RPM), PM2.5, SO<sub>2</sub>, NO<sub>x</sub>, Pb, Hg, and As were well within the limits of concentrations promulgated by CPCB, New Delhi in the study area.

### 1.8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (April-May-June-2018) indicates that the wind was blowing predominantly from (WSW and SW) directions, during study period, for 0.22 % wind was found to be calm. The graphical illustration and wind rose diagram is presented in Figures-1 & 2 respectively.

**Table.1**  
**Wind Frequency Distribution Data**

Sr.No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
1	348.75 - 11.25	0.000000	0.003917	0.002798	0.000000	0.000000	0.000000	0.006715
2	11.25 - 33.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
3	33.75 - 56.25	0.000000	0.000000	0.001119	0.000000	0.000000	0.000000	0.001119
4	56.25 - 78.75	0.000000	0.001119	0.002798	0.000000	0.000000	0.000000	0.003917
5	78.75 - 101.25	0.000000	0.001679	0.002798	0.000560	0.000000	0.000000	0.005036
6	101.25 - 123.75	0.000000	0.002798	0.000560	0.002238	0.000000	0.000000	0.005596
7	123.75 - 146.25	0.002798	0.003917	0.003917	0.001119	0.000000	0.000000	0.011752
8	146.25 - 168.75	0.001679	0.006715	0.010632	0.003358	0.000000	0.000000	0.022384
9	168.75 - 191.25	0.002798	0.013430	0.022943	0.008394	0.000560	0.000000	0.048125
10	191.25 - 213.75	0.004477	0.030218	0.050923	0.013430	0.001119	0.000000	0.100168
11	213.75 - 236.25	0.005596	0.044208	0.100727	0.027420	0.001119	0.000000	0.179071
12	236.25 - 258.75	0.005596	0.051483	0.095691	0.060996	0.000560	0.000000	0.214326
13	258.75 - 281.25	0.006156	0.034695	0.096810	0.055400	0.000000	0.000000	0.193061
14	281.25 - 303.75	0.006715	0.029659	0.057639	0.036374	0.000000	0.000000	0.130386
15	303.75 - 326.25	0.004477	0.020145	0.022943	0.003917	0.001119	0.000000	0.052602
16	326.25 - 348.75	0.002238	0.009513	0.010632	0.000000	0.001119	0.000000	0.023503
	<b>Sub-Total</b>	<b>0.042529</b>	<b>0.253497</b>	<b>0.482932</b>	<b>0.213206</b>	<b>0.005596</b>	<b>0.000000</b>	<b>0.997204</b>
	Calms							<b>0.002237</b>
	Missing/Incomplete							<b>0.000559</b>
	<b>Total</b>							<b>1.000000</b>

### SUMMARY OF WIND PATTERN

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
April-May-June 2018	WSW (21%)	SW (18%)	0.22 %



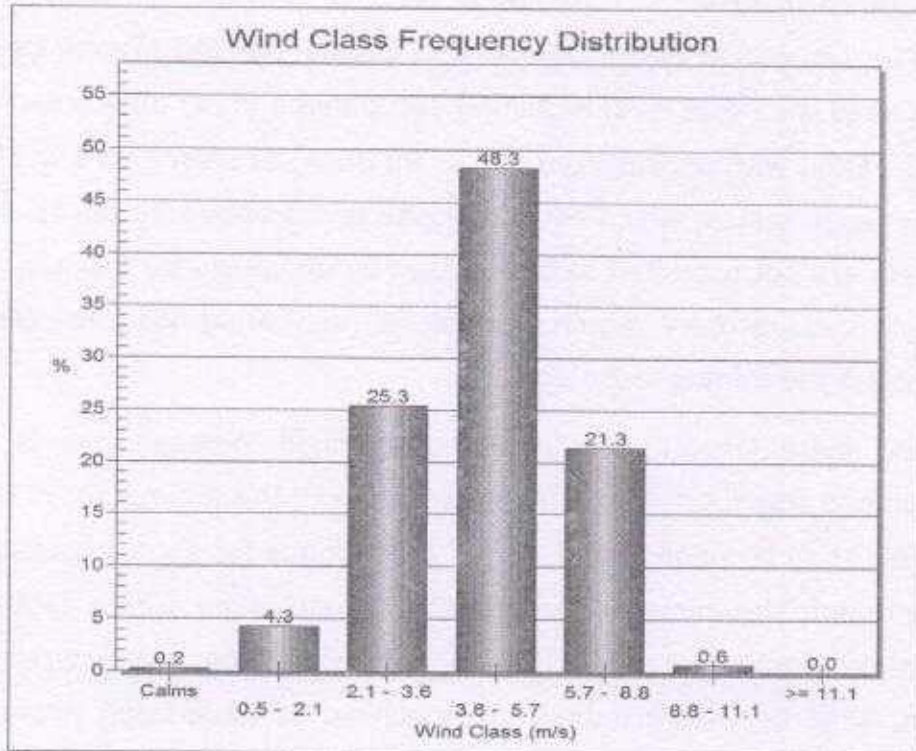


Figure.01: Wind Class Frequency Distribution (April-May-June-2018).

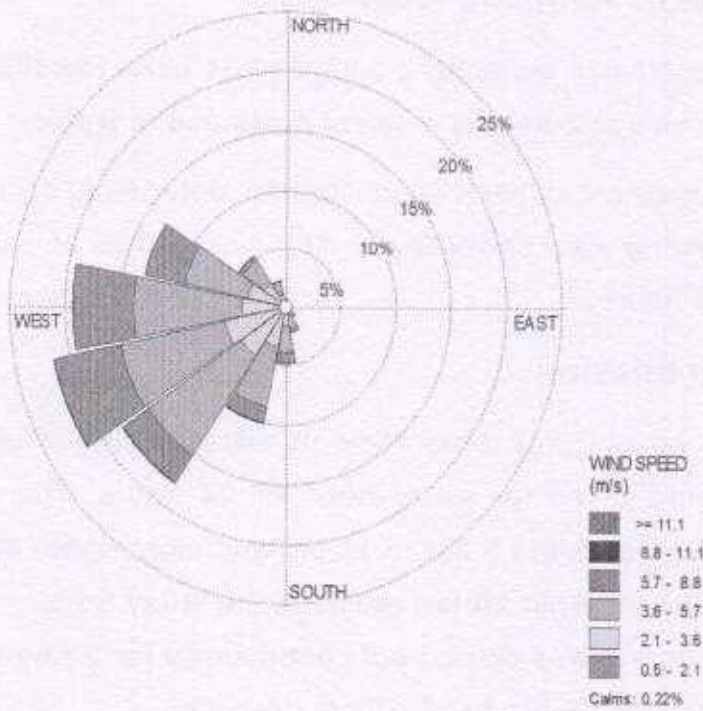


Figure.02: Wind Rose Diagram (April-May-June-2018)



Noise levels monitored during day and night at 8 locations are found to be below the stipulated standard of CPCB as for Industrial area as 75 dB(A) and 70dB(A) for day and night respectively as given in **(Table 15)**.

#### **Instrument used for monitoring**

Noise levels were measured using integrated sound level meter manufactured by Envirotech made in India (Model no. SLM-100). This instrument is capable of measuring the Sound Pressure Level (SPL), Leq.

### **1.7 Water Quality**

The existing status of water quality for groundwater and surface water was assessed by collecting the water samples from underground wells from the piprapat/Nr.mining area and surface water sample from nallahs nearby mining area. The physico-chemical analysis of ground and surface water samples collected during study period reported as average of three month given in (Table 16 & 17). The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water and found to be fit for drinking purpose for tested parameters. Surface water quality is satisfactory as per IS 10500-2012 for surface water. Thus the impacts due to mining activities in each month have been found to be insignificant.



Month-wise Summary of Statistical Analysis of SPM

1.8 Fugitive Emission (Core Zone):-

1.8.1 Presentation of Results.

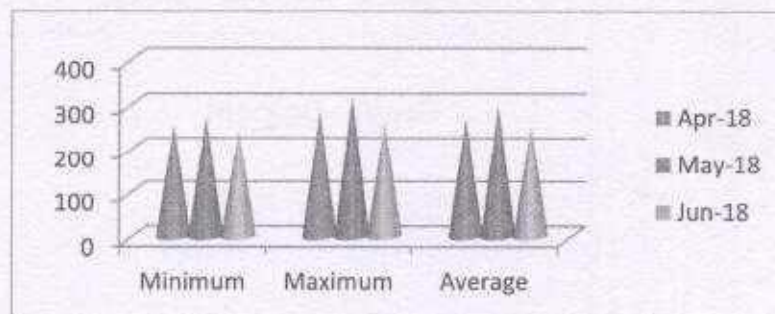
The summary of Statistical Analysis of SPM results for the month of April to June-2018 are presented in detail in Table 6. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Piprapat / Nr.Mining Area

For the Month of April-2018 the minimum and maximum concentrations for SPM were recorded as 255 $\mu\text{g}/\text{m}^3$  and 284 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 270 $\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for SPM were recorded as 273 $\mu\text{g}/\text{m}^3$  and 320 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 297 $\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for SPM were recorded as 241 $\mu\text{g}/\text{m}^3$  and 263 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 252 $\mu\text{g}/\text{m}^3$ .



Graph :- Piprapat / Nr.Mining Area

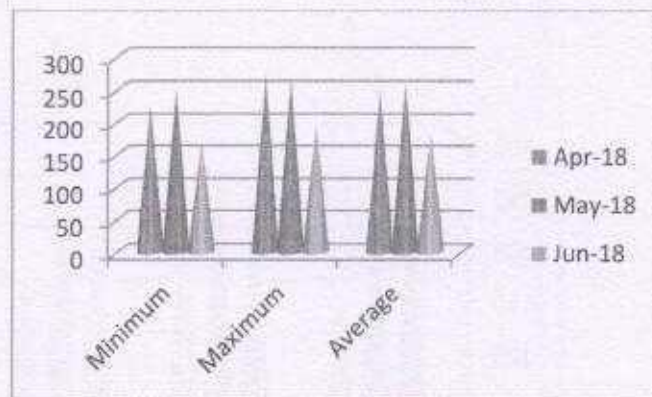


**Virhorepat**

For the Month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $223\mu\text{g}/\text{m}^3$  and  $273\mu\text{g}/\text{m}^3$  respectively and average concentration of  $248\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $252\mu\text{g}/\text{m}^3$  and  $267\mu\text{g}/\text{m}^3$  respectively and average concentration of  $260\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $167\mu\text{g}/\text{m}^3$  and  $193\mu\text{g}/\text{m}^3$  respectively and average concentration of  $180\mu\text{g}/\text{m}^3$ .



Graph: - Virhorepat



**1.9 Fugitive Emission (Buffer Zone):-**

**1.9.1 Presentation of Results.**

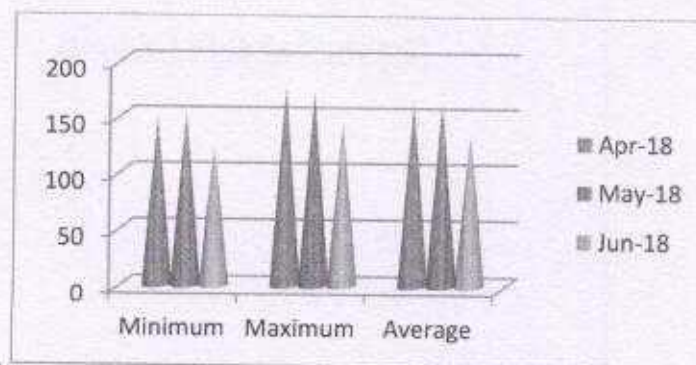
The summary of Statistical Analysis of SPM results for the month of April to June-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Kutku Village / Nr.V.T.Center**

For the Month of April-2018 the minimum and maximum concentrations for SPM were recorded as 149 $\mu\text{g}/\text{m}^3$  and 178 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 164 $\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for SPM were recorded as 152 $\mu\text{g}/\text{m}^3$  and 173 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 163 $\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for SPM were recorded as 124 $\mu\text{g}/\text{m}^3$  and 146 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 135 $\mu\text{g}/\text{m}^3$ .



**Graph:-Kutku Village / Nr.V.T.Center**

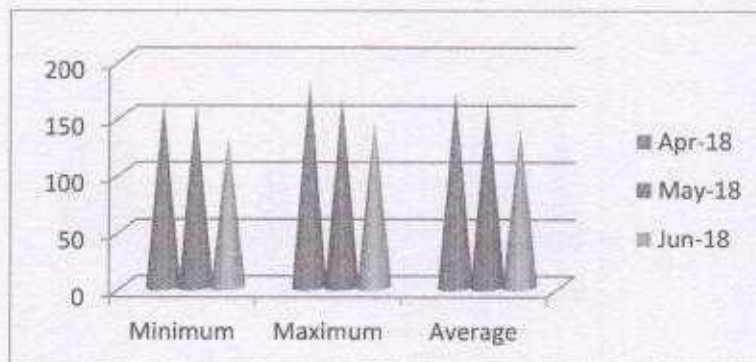


**Rajendrapur / Nr.Mining Area**

For the Month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $163\mu\text{g}/\text{m}^3$  and  $182\mu\text{g}/\text{m}^3$  respectively and average concentration of  $173\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $160\mu\text{g}/\text{m}^3$  and  $167\mu\text{g}/\text{m}^3$  respectively and average concentration of  $164\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $132\mu\text{g}/\text{m}^3$  and  $146\mu\text{g}/\text{m}^3$  respectively and average concentration of  $139\mu\text{g}/\text{m}^3$ .



**Graph:-Rajendrapur / Nr.Mining Area**





Table 7

## Statistical analysis of RSPM

Unit:  $\mu\text{g}/\text{m}^3$ 

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
Piprapat/Nr.Mining Area	April-2018	64	71	68	68	71
	May-2018	60	69	65	65	69
	June-2018	55	64	60	60	64
Betpani	April-2018	68	80	74	74	80
	May-2018	70	85	78	78	85
	June-2018	65	75	70	70	75
Virhorepat	April-2018	62	69	66	66	69
	May-2018	67	80	74	74	80
	June-2018	53	61	57	57	61
Tatijharia Village/Nr.Weigh Bridge	April-2018	68	75	72	72	75
	May-2018	63	78	71	71	78
	June-2018	52	64	58	58	64
		<b>100 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
Kutku Village/ Nr.V.T.Center	April-2018	55	67	61	61	67
	May-2018	49	63	56	56	63
	June-2018	46	56	51	51	56
Sairaidh Campus	April-2018	52	62	57	57	62
	May-2018	56	68	62	62	68
	June-2018	41	57	49	49	57
Rajendrapur/ Nr.Mining Area	April-2018	55	66	61	61	66
	May-2018	47	55	51	51	55
	June-2018	38	46	42	42	46
Dumerkholi/ Nr.Mining Area	April-2018	55	65	60	60	65
	May-2018	49	66	58	58	66
	June-2018	37	49	43	43	49
<b>CPCB Standard</b>		<b>100 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

**Conclusion (A):-**

- 5) Piprapat /Nr.Mining Lease Area Core Zone: For the Months of Apr-May-June -2018 Average of RSPM is  $64\mu\text{g}/\text{m}^3$ .
  - 6) Betpani Lease Area Core Zone:- For the Months of Apr-May-June -2018 Average of RSPM is  $74\mu\text{g}/\text{m}^3$ .
  - 7) Virhorepat Lease Area Core Zone:- For the Months of Apr-May-June -2018 Average of RSPM is  $66\mu\text{g}/\text{m}^3$ .
  - 8) Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone:-For the Months of Apr-May-June -2018 Avg of RSPM is  $67\mu\text{g}/\text{m}^3$ .
- The Average Concentration of RSPM within the Core Zone of Tatijharia Lease is  $68\mu\text{g}/\text{m}^3$ .

**Conclusion (B):-**

- 5) Kutku Village/ Nr.V.T.Center Lease Area Buffer Zone:- For the Months Apr-May-June -2018 Average of RSPM is  $56\mu\text{g}/\text{m}^3$ .
  - 6) Sairaidh Campus Lease Area Buffer Zone:- For the Months of Apr-May-June -2018 Average of RSPM is  $56\mu\text{g}/\text{m}^3$ .
  - 7) Rajendrapur/ Nr.Mining Lease Area Buffer Zone:-For the Months of Apr-May-June -2018 Average of RSPM is  $51\mu\text{g}/\text{m}^3$ .
  - 8) Dumerkholi/ Nr.Mining Lease Area Buffer Zone:-For the Months of Apr-May-June -2018 Average of RSPM is  $54\mu\text{g}/\text{m}^3$ .
- The Average Concentration of RSPM within the Buffer Zone of Tatijharia Lease is  $54\mu\text{g}/\text{m}^3$ .

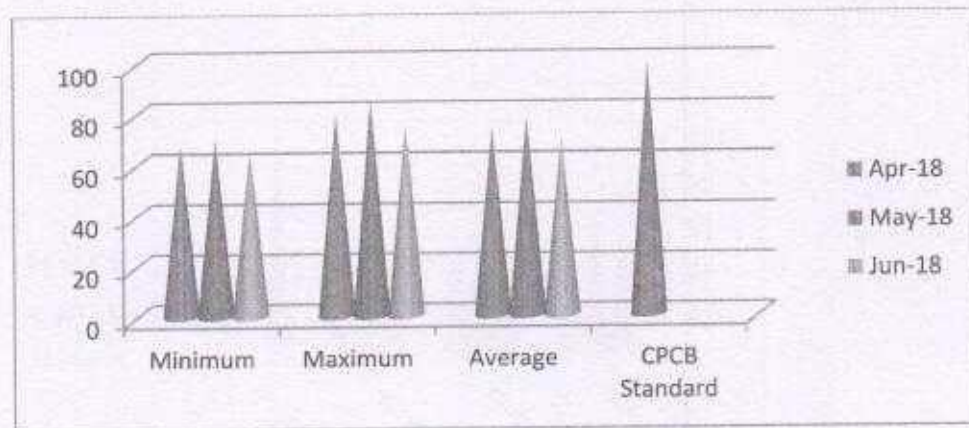


**Betpani**

For the Month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $68\mu\text{g}/\text{m}^3$  and  $80\mu\text{g}/\text{m}^3$  respectively and average concentration of  $74\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $70\mu\text{g}/\text{m}^3$  and  $85\mu\text{g}/\text{m}^3$  respectively and average concentration of  $78\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for RSPM were recorded as  $65\mu\text{g}/\text{m}^3$  and  $75\mu\text{g}/\text{m}^3$  respectively and average concentration of  $70\mu\text{g}/\text{m}^3$ .



**Graph:-Betpani**

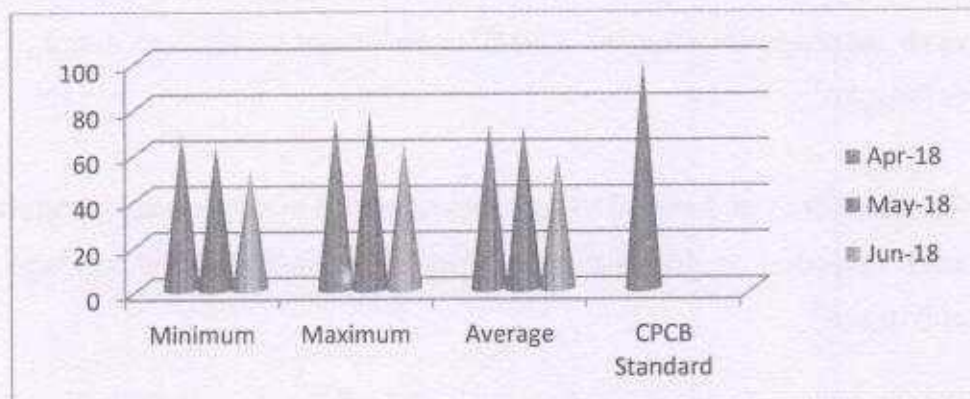


**Tatijharia Village/Nr.Weigh Bridge**

For the Month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $68\mu\text{g}/\text{m}^3$  and  $75\mu\text{g}/\text{m}^3$  respectively and average concentration of  $72\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $63\mu\text{g}/\text{m}^3$  and  $78\mu\text{g}/\text{m}^3$  respectively and average concentration of  $71\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for RSPM were recorded as  $52\mu\text{g}/\text{m}^3$  and  $64\mu\text{g}/\text{m}^3$  respectively and average concentration of  $58\mu\text{g}/\text{m}^3$ .



**Graph:-Tatijharia Village/Nr.Weigh Bridge**

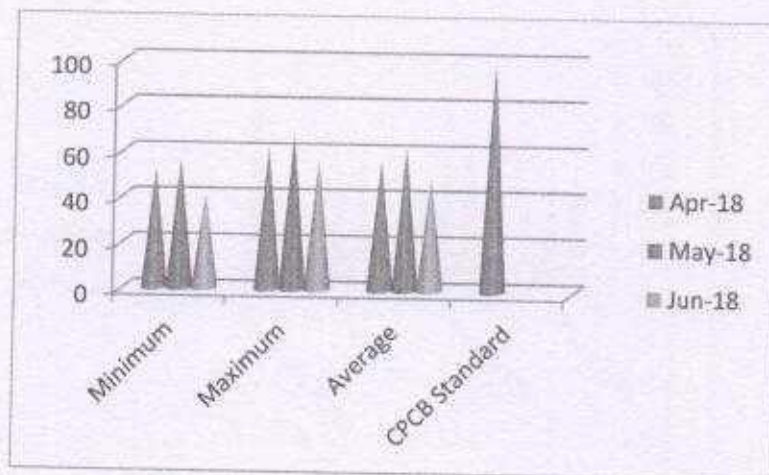


**Sairaidh Campus**

For the Month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $52\mu\text{g}/\text{m}^3$  and  $62\mu\text{g}/\text{m}^3$  respectively and average concentration of  $57\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $56\mu\text{g}/\text{m}^3$  and  $68\mu\text{g}/\text{m}^3$  respectively and average concentration of  $62\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for RSPM were recorded as  $41\mu\text{g}/\text{m}^3$  and  $57\mu\text{g}/\text{m}^3$  respectively and average concentration of  $49\mu\text{g}/\text{m}^3$ .



**Graph:-Sairaidh Campus**

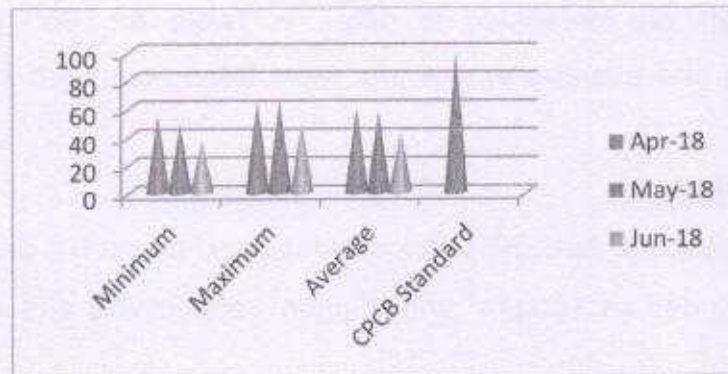


**Dumerkholi / Nr.Mining Area**

For the Month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $55\mu\text{g}/\text{m}^3$  and  $65\mu\text{g}/\text{m}^3$  respectively and average concentration of  $60\mu\text{g}/\text{m}^3$ .

For the Month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $49\mu\text{g}/\text{m}^3$  and  $66\mu\text{g}/\text{m}^3$  respectively and average concentration of  $58\mu\text{g}/\text{m}^3$ .

For the Month of June-2018 the minimum and maximum concentrations for RSPM were recorded as  $37\mu\text{g}/\text{m}^3$  and  $49\mu\text{g}/\text{m}^3$  respectively and average concentration of  $43\mu\text{g}/\text{m}^3$ .



**Graph:- Dumerkholi / Nr.Mining Area**



**Table 9**  
**Statistical Analysis of SO<sub>2</sub>**

Unit:  $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Piprapat/Nr.Mining Area</b>	April-2018	10	17	14	14	17
	May-2018	12	19	16	16	19
	June-2018	8	13	11	11	13
<b>Betpani</b>	April-2018	9	12	11	11	12
	May-2018	9	15	12	12	15
	June-2018	6	13	10	10	13
<b>Virhorepat</b>	April-2018	7	14	11	11	14
	May-2018	8	15	12	12	15
	June-2018	6	11	9	9	11
<b>Tatijharia Village/Nr.Weigh Bridge</b>	April-2018	9	16	13	13	16
	May-2018	6	12	9	9	12
	June-2018	6	9	8	8	9
<b>Buffer Zone :-</b>						
<b>Kutku Village/ Nr.V.T.Center</b>	April-2018	8	11	10	10	11
	May-2018	9	13	11	11	13
	June-2018	6	8	7	7	8
<b>Sairaidh Campus</b>	April-2018	9	11	10	10	11
	May-2018	8	10	9	9	10
	June-2018	7	9	8	8	9
<b>Rajendrapur/ Nr.Mining Area</b>	April-2018	10	14	12	12	14
	May-2018	9	13	11	11	13
	June-2018	6	11	9	9	11
<b>Dumerkholi/ Nr.Mining Area</b>	April-2018	8	11	10	10	11
	May-2018	9	15	12	12	15
	June-2018	6	9	8	8	9
<b>CPCB Standard</b>		<b>80 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

**Conclusion: (A)**

- 1) **Piprapat /Nr.Mining Lease Area Core Zone:** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 14  $\mu\text{g}/\text{m}^3$ .
  - 2) **Betpani Lease Area Core Zone:** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 11  $\mu\text{g}/\text{m}^3$ .
  - 3) **Virhorepat Lease Area Core Zone:** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 11  $\mu\text{g}/\text{m}^3$ .
  - 4) **Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone:** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 10  $\mu\text{g}/\text{m}^3$ .
- The Average Concentration of SO<sub>2</sub> within the Core Zone of Tatijharia Lease during this period (Apr-May-June-2018) is 11  $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion: (B)**

1. **Kutku Village/ Nr.V.T.Center Lease Area Buffer Zone:-** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 9  $\mu\text{g}/\text{m}^3$ .
2. **Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 9  $\mu\text{g}/\text{m}^3$ .
3. **Rajendrapur/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 10  $\mu\text{g}/\text{m}^3$ . SO<sub>2</sub> is 11  $\mu\text{g}/\text{m}^3$ .
4. **Dumerkholi/ Nr.Mining Area :** For the Months of Apr-May-June-2018 Average of SO<sub>2</sub> is 10  $\mu\text{g}/\text{m}^3$ . SO<sub>2</sub> is 10  $\mu\text{g}/\text{m}^3$ .

**\*\*The Average Concentration of SO<sub>2</sub> within the Buffer Zone of Tatijharia Lease during this period (Apr-May-June-2018) is 10  $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.**

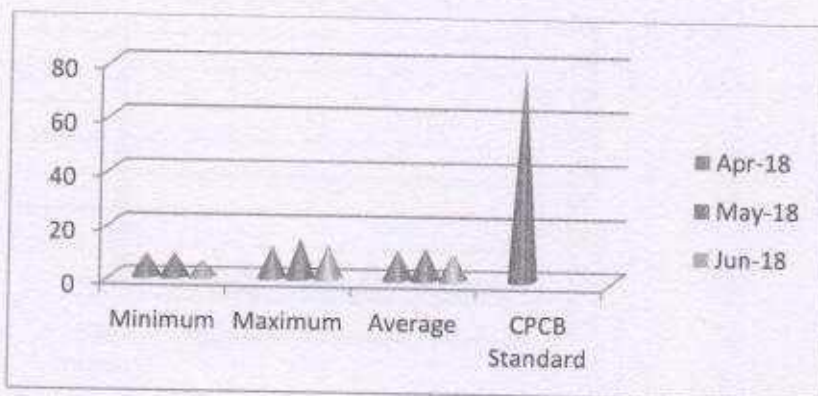


**Betpani**

For the Month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 12µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 10µg/m<sup>3</sup>.



**Graph:-Betpani**

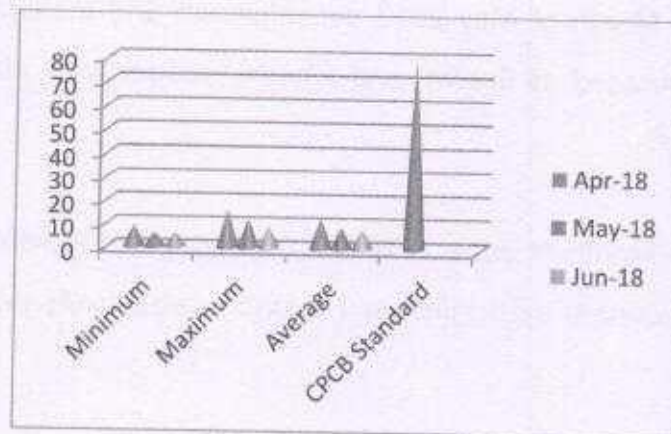


**Tatijharia Village/Nr.Weigh Bridge**

For the Month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 16µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 9µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6µg/m<sup>3</sup> and 9µg/m<sup>3</sup> respectively and average concentration of 8µg/m<sup>3</sup>.



**Graph:-Tatijharia Village/Nr.Weigh Bridge**

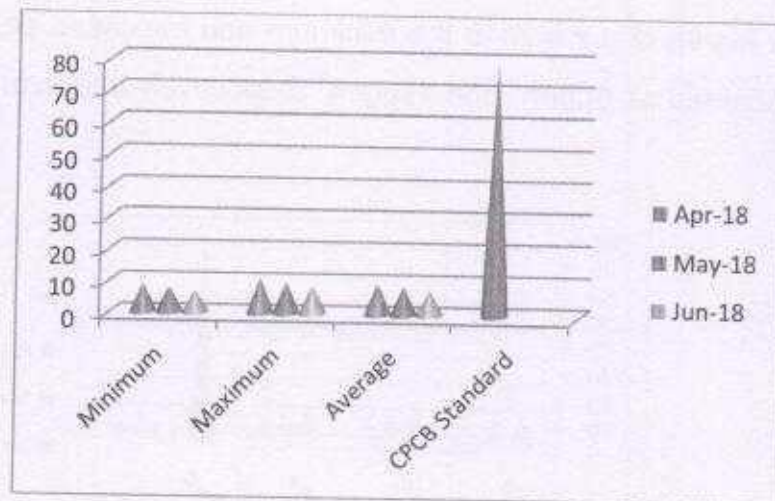


**Sairaidh Campus**

For the Month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 11µg/m<sup>3</sup> respectively and average concentration of 10µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8µg/m<sup>3</sup> and 10µg/m<sup>3</sup> respectively and average concentration of 9µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7µg/m<sup>3</sup> and 9µg/m<sup>3</sup> respectively and average concentration of 8µg/m<sup>3</sup>.



**Graph:-Sairaidh Campus**

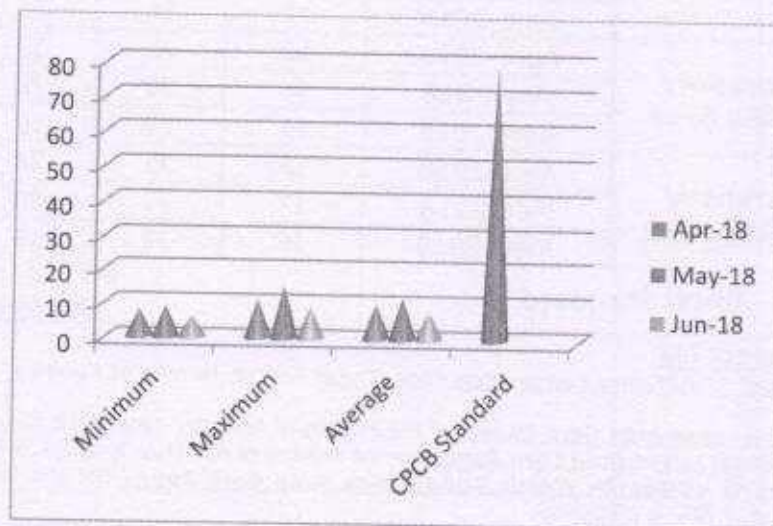


**Dumerkholi / Nr.Mining Area**

For the Month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8µg/m<sup>3</sup> and 11µg/m<sup>3</sup> respectively and average concentration of 10µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 12µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6µg/m<sup>3</sup> and 9µg/m<sup>3</sup> respectively and average concentration of 8µg/m<sup>3</sup>.



**Graph:-Dumerkholi / Nr.Mining Area**



**Month-wise Summary of Statistical Analysis of NO<sub>x</sub>**

**2.5 Fugitive Emission (Core Zone):-**

**2.5.1 Presentation of Results.**

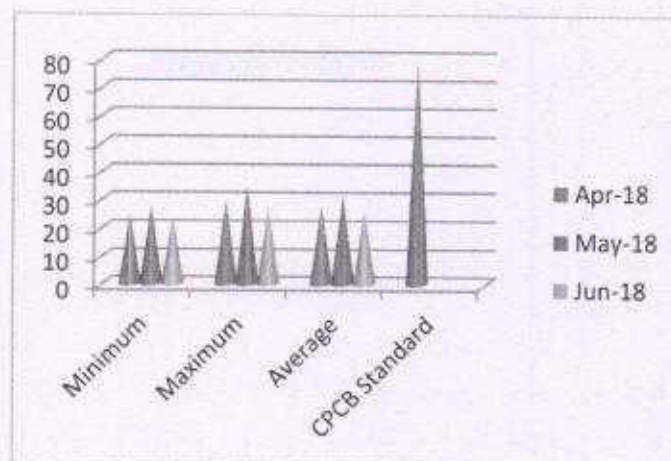
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of April-May-June-2018 are presented in detail in Table 10. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Piprapat / Nr.Mining Area**

For the Month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 25µg/m<sup>3</sup> and 30µg/m<sup>3</sup> respectively and average concentration of 28µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 28µg/m<sup>3</sup> and 35µg/m<sup>3</sup> respectively and average concentration of 32µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 24µg/m<sup>3</sup> and 27µg/m<sup>3</sup> respectively and average concentration of 26µg/m<sup>3</sup>.



**Graph :- Piprapat / Nr.Mining Area**

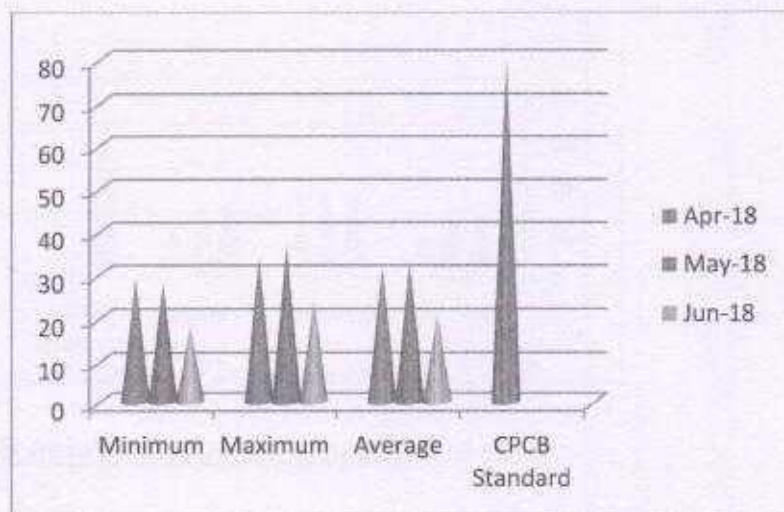


**Virhorepat**

For the Month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 29µg/m<sup>3</sup> and 34µg/m<sup>3</sup> respectively and average concentration of 32µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 28µg/m<sup>3</sup> and 37µg/m<sup>3</sup> respectively and average concentration of 33µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18µg/m<sup>3</sup> and 24µg/m<sup>3</sup> respectively and average concentration of 21µg/m<sup>3</sup>.



**Graph:-Virhorepat**



**2.6 Fugitive Emission (Buffer Zone):-**

**2.6.1 Presentation of Results.**

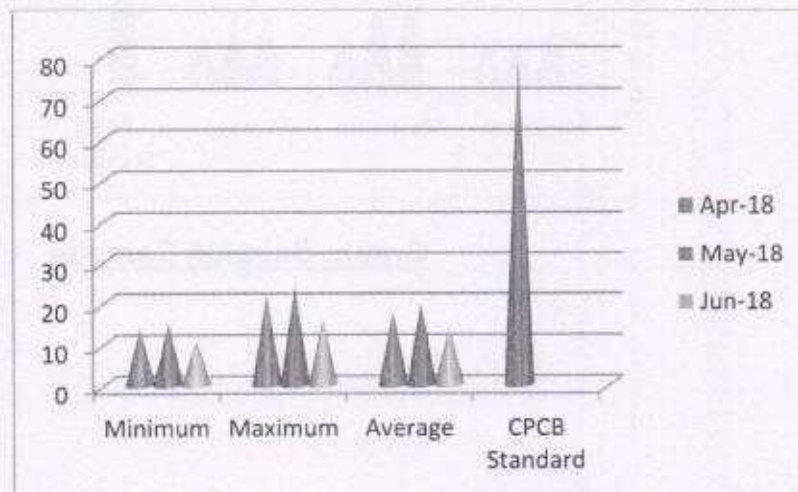
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of April-2018 to June-2018 are presented in detail in Table 10. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Kutku Village / Nr.V.T.Center**

For the Month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14µg/m<sup>3</sup> and 22µg/m<sup>3</sup> respectively and average concentration of 18µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15µg/m<sup>3</sup> and 24µg/m<sup>3</sup> respectively and average concentration of 20µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 11µg/m<sup>3</sup> and 16µg/m<sup>3</sup> respectively and average concentration of 14µg/m<sup>3</sup>.



**Graph:-Kutku Village / Nr.V.T.Center**

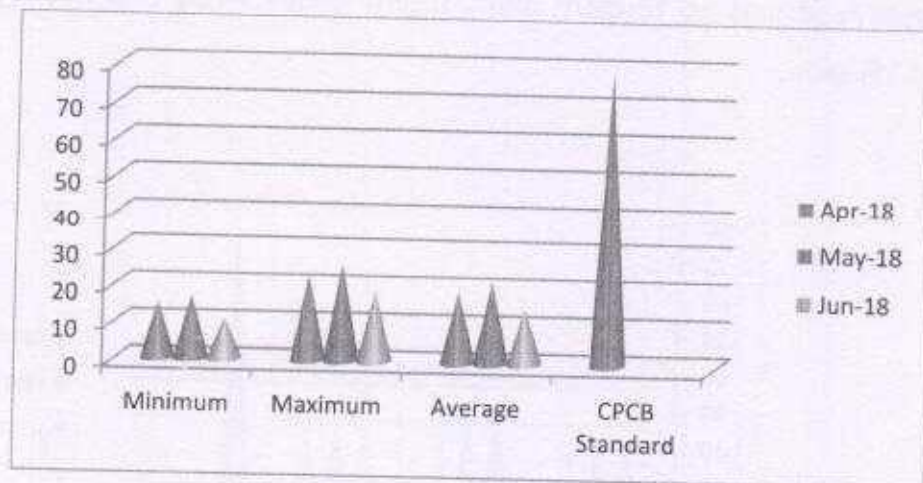


**Rajendrapur / Nr.Mining Area**

For the Month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15µg/m<sup>3</sup> and 23µg/m<sup>3</sup> respectively and average concentration of 19µg/m<sup>3</sup>.

For the Month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17µg/m<sup>3</sup> and 26µg/m<sup>3</sup> respectively and average concentration of 22µg/m<sup>3</sup>.

For the Month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 11µg/m<sup>3</sup> and 19µg/m<sup>3</sup> respectively and average concentration of 15µg/m<sup>3</sup>.



**Graph:-Rajendrapur / Nr.Mining Area**



Table 11

Statistical Analysis of Pb

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%ile
<b>Fugitive Emission (Core Zone):-</b>						
Piprapat/ Nr.Mining Area	April-2018	0.026	0.055	0.041	0.041	0.054
	May-2018	0.031	0.064	0.048	0.048	0.063
	June-2018	0.024	0.038	0.031	0.031	0.038
Betpani	April-2018	0.034	0.063	0.049	0.049	0.062
	May-2018	0.031	0.055	0.043	0.043	0.055
	June-2018	0.027	0.043	0.035	0.035	0.043
Virhorepat	April-2018	0.051	0.068	0.060	0.060	0.068
	May-2018	0.048	0.063	0.056	0.056	0.063
	June-2018	0.041	0.052	0.047	0.047	0.052
Tatijharia Village/Nr.Weigh Bridge	April-2018	0.034	0.045	0.040	0.040	0.045
	May-2018	0.028	0.042	0.035	0.035	0.042
	June-2018	0.021	0.038	0.030	0.030	0.038
<b>CPCB Standard</b>		<b>1.0 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%ile
<b>Buffer Zone :-</b>						
Kutku Village/ Nr.V.T.Center	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Sairaidh Campus	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Rajendrapur/ Nr.Mining Area	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Dumerkholi/ Nr.Mining Area	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>		<b>1.0 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

**Conclusion: (A)**

The Average concentration of Pb within the Core Zone of Tatijharia Lease during this period (April-May-June-2018) is  $0.060\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion: (B)**

The Average Concentration of Pb within the Buffer Zone of Tatijharia Lease during this period (April-May-June-2018) is not detected and it is within permissible limits as per CPCB Standard.





**Table 13**  
**Statistical Analysis of As**

Unit: ng/m<sup>3</sup>

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
Piprapat/ Nr.Mining Area	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Betpani	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Virhorepat	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Tatijharia Village/Nr.Weigh Bridge	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Buffer Zone :-</b>						
Kutku Village/ Nr.V.T.Center	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Sairaidh Campus	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Rajendrapur/ Nr.Mining Area	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
Dumerkholi/ Nr.Mining Area	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>		<b>06 ng/m<sup>3</sup> (Annual)</b>				

**Conclusion:**

The Average Concentration of As within the Core Zone and Buffer Zone of Tatijharia Lease during this period (April-May-June-2018) is not detected and it is within permissible limits as per CPCB Standard.





**Table 15**

**Noise Level Monitoring**

Sl. No.	Location	Unit: dB(A)					
		April 2018		May 2018		June 2018	
		Day	Night	Day	Night	Day	Night
<b>Core Zone</b>							
1.	Piprapat/Nr.Mining Area	67.2	54.9	61.3	48.2	56.1	42.8
2.	Betpani	61.7	51.8	59.2	46.3	53.2	43.7
3.	Virhorepat	57.3	48.2	62.9	52.6	61.7	53.4
4.	Tatijharia Village/ Nr.Weigh Bridge	59.1	47.3	61.4	56.1	58.3	42.9
<b>Buffer Zone</b>							
5.	Kutku Village/Nr.V.T.Center	48.1	37.6	52.7	42.9	46.3	37.1
6.	Sairaidh Campus	51.7	43.9	47.3	37.2	52.8	42.9
7.	Rajendrapur/Nr.Mining Area	53.6	41.7	49.6	38.1	51.7	38.2
8.	Dumerkholi/Nr.Mining Area	47.3	38.4	51.8	41.9	41.6	36.1

CPCB Standards for Residential Area: 55 (Day time) 45 (Night time)  
Industrial Area: 75 (Day time) 70 (Night time)

**Table 15-A**

**HEMM Spot Noise Level Monitoring**

Sl. No.	Location	Unit: dB(A)								
		April 2018			May 2018			June 2018		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1.	Piprapat/Nr.Mining Area	62.7	74.9	<b>68.8</b>	68.3	82.4	<b>75.4</b>	62.7	74.9	<b>68.8</b>





**Hindalco Industries Limited**  
**Tatijharia Mining Environmental Status Report for**  
**April-2018 To June-2018**

**Introduction**

40.	Anionic detergents (as MBAS)	mg/l	IS 13428:2005 (Annex K)	0.2	1.0	< 0.001
41.	Polynuclear aromatic hydrocarbon (PAH)	µg/l	USEPA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	---	---	Absent
43.	<i>Escherichia coli</i>	Per100 ml	IS 1622	Absent	Absent	Absent
<b>44.</b>	<b>Pesticides residues</b>					
i.	Alpha-HCH	µg/l	USEPA 508		0.01	Absent
ii.	Beta HCH	µg/l	USEPA 508		0.04	Absent
iii.	Delta- HCH	µg/l	USEPA 508		0.04	Absent
iv.	Alachlor	µg/l	USEPA 508		20	Absent
v.	Aldrin / Dieldrin	µg/l	USEPA 508		0.03	Absent
vi.	Atrazine	µg/l	USEPA 1657		2	Absent
vii.	Butachlor	µg/l	USEPA 508		125	Absent
viii.	Chlorpyrifos	µg/l	USEPA 1657		30	Absent
ix.	DDT and its Isomers	µg/l	USEPA 508		1	Absent
x.	Gamma - HCH (Lindane)	µg/l	USEPA 508		2	Absent
xi.	2,4 Dichloro-phenoxyacetic acid	µg/l	USEPA 1657		30	Absent
xii.	Endosulphan	µg/l	USEPA 508		0.4	Absent
xiii.	Ethion	µg/l	USEPA 1657		3	Absent
xiv.	Isoproturon	µg/l	USEPA 1657		9	Absent
xv.	Malathion	µg/l	USEPA 1657		190	Absent
xvi.	Methyl Parathion	µg/l	USEPA 1657		0.3	Absent
xvii.	Monocrotophos	µg/l	USEPA 1657		1	Absent
xviii.	Phorate	µg/l	USEPA 1657		2	Absent

**Note:** 1. Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. \*Permissible limit in the absence of alternate source. 4. 'mg/l' is equivalent to 'ppm' 5. 'µg/l' is equivalent to 'ppb' 6. '<' indicates detection limit of the laboratory. 7. MPN-Most probable number. 8. Results for test no. 7 are not applicable.

**REMARKS:** Based upon request of the party, sample was tested for above mentioned parameters only. Sample complies with IS:10500:2012, for tests conducted, indicating that it is fit for drinking purpose with respect to tested parameters.



**Table 18**

**Report on Soil Analysis, Tatijharia**

**Date of collection: May-2018.**

**Sample Location: Piprapat/Nr.Mining Area**

Sr. No	Test Parameters	Measurement Unit	Results
1	pH	-	7.32 at 25°C
2	Electrical Conductivity at 25°C	µs/cm	144.9
3	Texture	-	Clay Loam
4	Sand	%	35.25
5	Silt	%	28.69
6	Clay	%	36.06
7	Bulk Density	g/cc	1.56
8	Porosity	%	12.64
9	Water Holding Capacity	%	19.49
10	Exchangeable Calcium as Ca	mg/kg	633.4
11	Exchangeable Magnesium as Mg	mg/kg	147.6
12	Exchangeable Sodium as Na	mg/kg	120.4
13	Available Potassium as K	kg/hect.	391.2
14	Available Phosphorous as P	kg/hect.	15.29
15	Available Nitrogen as N	kg/hect.	193.39
16	Organic Matter	%	1.08
17	Organic Carbon	%	0.63
18	Water Soluble Chloride as Cl <sup>-</sup>	mg/kg	11.7
19	Water Soluble Sulphate as SO <sub>4</sub>	mg/kg	541.6
20	Sodium Absorption Ratio	-	6.31
21	CEC	meq/100 gm	13.72
22	Total Iron	mg/kg	1156
23	Available Manganese	mg/kg	121.3
24	Available Zinc	mg/kg	73.8
25	Available Boron	mg/kg	ND

**Note:** 1. Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. 'mg/Kg' is equivalent to 'ppm'. 4. 'g/100g' is equivalent to '%w/w'. 5. All parameters are in 1:5 water extract.

**REMARKS:** Based upon request of party, sample was tested for above mentioned parameters only.



