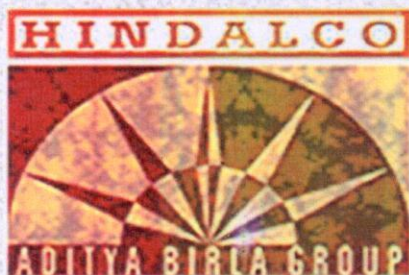


Environmental Status Report  
For  
Samri Bauxite Mine  
at  
Post & Teh.: Samri, (Kusmi)  
Dist: Balrampur-Ramanujganj(C.G.)

**Duration: July-August-September-2018**

Name of Industry:-



*Rupendra Singh*

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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info@anacon.in  
Website: www.anaconlaboratories.com,

## 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 pre requisite 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 **July-2018 to September-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 : September, 2018



A handwritten signature in blue ink, appearing to read "D. Gawle".

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 Aluminium.

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. HINDALCO possesses bauxite mine leases of Kudag, Samri and Tatijharia 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 Environmental monitoring of parameters for assessing pollution levels and preparation of monthly report (July, August & September-2018) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment, Forest and Climate Change (MoEFCC) for Samri mining leases in Balrampur District, Chhattisgarh State.

## **1.2 Background Information of Samri Mine**

HINDALCO was granted Samri Bauxite mining lease over an area of 2146.746 hec in Samri, Dumarkholi, Gopatu villages in Post Office & Tehsil Samri (Kusmi) of Balrampur district, Chhattisgarh on 24/06/1998 for a period of **50** years. The mining operations were started on 25/05/1999. The production capacity of Bauxite is 5.0 Lakh Tonnes Per Annum (LTPA).

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

The deposits occur in Samri block, Post Office & Tahsil Samri (Kusmi) 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)**

**Table 1**

**Salient Features of Samri Bauxite Mines**

| S.No. | Particulars                                 | Details   |
|-------|---|---|
| 1.    | Survey of India Topo sheet No.              | 64 M /15  |
| 2.    | Latitude                                    | 23 <sup>o</sup> 23' 02"N to 23 <sup>o</sup> 27' 05"N  |
| 3.    | Longitude                                   | 83 <sup>o</sup> 53' 50"E to 83 <sup>o</sup> 57' 59"E  |
| 4.    | Elevation                                   | 1140-m above Mean Sea Level   |
| 5.    | Climatic Conditions (as per IMD, Ambikapur) | Annual maximum temperature : 30.3 <sup>o</sup> C<br>Annual minimum temperature : 17.7 <sup>o</sup> C<br>Average annual rainfall : 1401.1 mm |
| 6.    | Mining lease area                           | 2146.746 hec.   |
| 7.    | Method of mining                            | Open cast (Semi-Mechanized)   |
| 8.    | Mode of transportation                      | Trucks  |
| 9.    | Land use                                    | Agricultural and Barren land  |
| 10.   | Nearest Road                                | Samri to Kusmi (17 km)  |
| 11.   | Nearest Airport                             | Ranchi (146.06 km, ESE)   |
| 12.   | Nearest Town                                | Ambikapur (127 km, SW)  |

**1.4 Environmental Monitoring**

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during mining operation. With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to mining operation of the project. Suitable mitigation steps will be taken in time to safeguard the environment, based on monitoring reports. Monitoring is important in the control of pollution since the efficiency of control measures can only be determined by monitoring.

In order to find out the impact of mining activity on sensitive receptors, it is necessary to monitor Environmental Quality to know the level of concentrations of pollutants within and around the mining lease area. Accordingly Hindalco Industries through Anacon Laboratories Pvt. Ltd., Nagpur has been monitoring at following locations for air, water and Noise on monthly basis during these months (**Table-2**).



## **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 Samri mine lease area as shown in (Fig. 1).

**Table 2**

**Locations of Ambient Air Quality Monitoring (AAQM) & Fugitive Emission**  
**(2146.746hec.)**

| <b>S.No.</b> | <b>Core zone</b>               | <b>Sr.No.</b> | <b>Buffer zone</b>                   |
|--------------|--------------------------------|---------------|--------------------------------------|
| 1            | Samri-Gopatu/Near Weigh Bridge | 5             | Sairaidh Campus                      |
| 2            | Rajendrapur/Near Mining Area   | 6             | Jaljali Village                      |
| 3            | Kutku Village/Near V.T.Center  | 7             | Tatijharia Village/Near Weigh Bridge |
| 4            | Dumerkholi/Near Mining Area    | 8             | Piprapat/Near 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. Anacon Laboratories Pvt. Ltd., Nagpur is carrying out regular monitoring for PM<sub>2.5</sub>, RPM(PM<sub>10</sub>), SO<sub>2</sub>, NO<sub>x</sub> and SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>, Pb, Hg, As and Cr at above Ambient Air Quality Monitoring (AAQM) locations and Fugitive Emission. The dust fall rate was measured in the mining area and Samri chowk during July-August-September-2018. The AAQM and Fugitive Emission sampling sites are selected considering seasonal variation in wind speed and wind direction.

#### **Sampling Duration and Frequency**

Ambient air quality monitoring and Fugitive Emission monitoring was carried out for the parameters PM<sub>2.5</sub>, RPM (PM<sub>10</sub>), SO<sub>2</sub>, NO<sub>x</sub> and SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub> Pb, Hg, As and Cr, from July-August-September-2018 as per CPCB norms. Sampling Duration and 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) 18<sup>th</sup> November, 2009 and as per consent conditions mentioned in consent letter.



## **MONITORED PARAMETERS AND FREQUENCY OF SAMPLING**

### **Methods and Instruments used for Sampling**

The air samples were analyzed as per methods specified by Central Pollution Control Board (CPCB).

The levels of Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur Dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Pb, Hg, As and Cr were monitored for establishing the baseline status. SPM and RPM was collected with the help of Respirable Particulate Sampler operating 24 hours by drawing air which passes through the cyclone at the rate of 1.0 -1.3 m<sup>3</sup>/min which collects the particles less than 10 µm diameter over glass fibre filter paper and the bigger particulates from 10 to 100 µm are collected into the cup provided at the bottom of the cyclone. The dust deposited over the filter paper is measured as RPM and the smaller particulates from 2.5 µm are collected into the Membrane Filter Paper. The dust fall rate was measured using dust fall jar. The jar was exposed for one month in the mining area and Samri-Gopatu during pre and post monsoon period. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (0.02 N solutions) to prevent any growth of algae. The water level in the jar is constantly maintained in such a way that 2 lit of water is always retained. The measurement techniques used for various pollutants and other details are given in **(Table 4)**.

Sampling was carried out continuously for 24 hourly monitoring twice a week at each station during the stipulated study period using pre-calibrated Respirable Dust Samplers in each of the stations.

Earmarked samples were collected for Particulate Matter-PM<sub>10</sub>, Particulate Matter-PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub> for 24 hourly. Collected samples were sent to Laboratories for analysis.

The baseline data of air environment is generated for the parameters namely:

Suspended Particulate Matter (SPM), Particulate Matter (PM<sub>10</sub>), Particulate Matter (PM<sub>2.5</sub>), Sulphur Dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Lead (Pb), Mercury (Hg), Arsenic (As) and Chromium (Cr) **Table-3.0.**



**Table-3.0**

| Parameters                            | Sampling frequency                                 |
|---------------------------------------|--|
| Suspended Particulate Matter          | 24 hourly sample twice a week for Three months     |
| Respirable Particulate Matter         | 24 hourly sample twice a week for Three months     |
| Particulate Matter 2.5                | 24 hourly sample twice a week for Three months     |
| Sulphur dioxide (SO <sub>2</sub> )    | 24 hourly sample twice a week for Three months     |
| Oxides of Nitrogen (NO <sub>x</sub> ) | 24 hourly sample twice a week for Three months     |
| Pb, Hg, As, Cr                        | 8 hourly basis for 24 hour sample for three months |

**Table 4.0**

**Measurement Techniques for various pollutants**

| S.No. | Parameter                     | Technique                                    | Technical Protocol  | Minimum Reportable Value (µg/ m <sup>3</sup> ) |
|-------|-------------------------------|--|---------------------|--|
| 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**

The summary of Fugitive Emission monitoring results for the month of July-August-September-2018 are presented in detail in **Table 6.0**. 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.

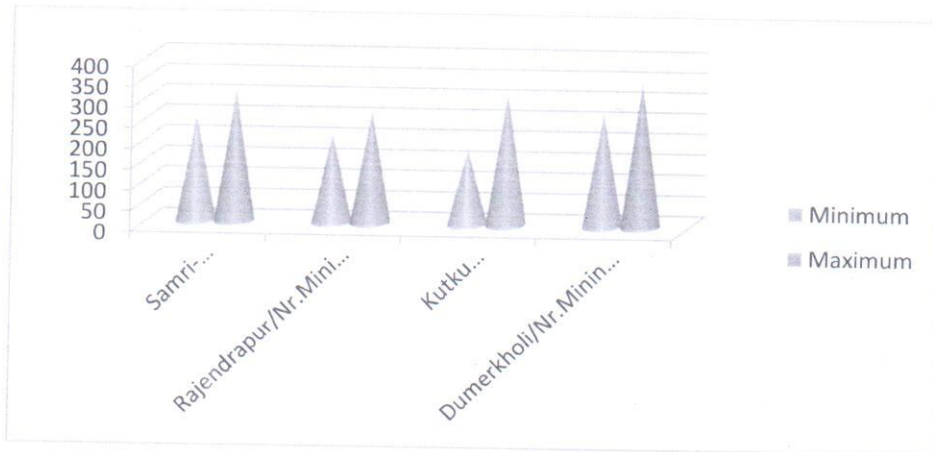


### 1.6.1 Presentation of Results.

#### Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as  $182\mu\text{g}/\text{m}^3$  and  $352\mu\text{g}/\text{m}^3$  respectively. The average concentrations were ranged between 199 to  $328\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 215 to  $351\mu\text{g}/\text{m}^3$  in the study area (Table 6).

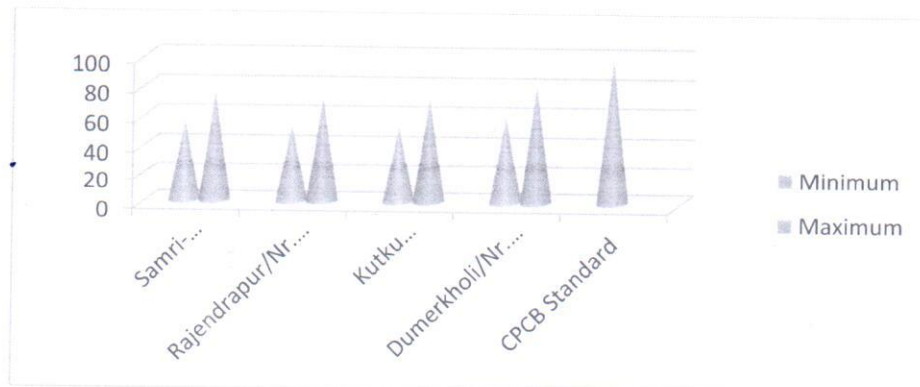
#### Graphical Presentation of Fugitive Emission SPM Monitoring



#### Respirable Suspended Particulate Matter -RSPM

The minimum and maximum concentrations for RSPM were recorded as  $54\mu\text{g}/\text{m}^3$  and  $81\mu\text{g}/\text{m}^3$  respectively. The average values were observed to be in the range of 61 to  $77\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 62 to  $81\mu\text{g}/\text{m}^3$  in the study area (Table 7).

#### Graphical Presentation of Fugitive Emission RSPM Monitoring





**Particulate Matter -PM<sub>2.5</sub>**

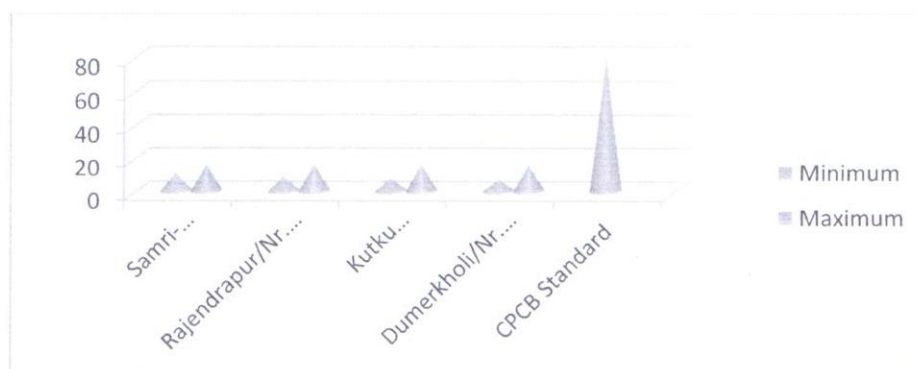
The minimum and maximum values of PM<sub>2.5</sub> concentrations varied between 18 to 34µg/m<sup>3</sup> respectively. The average values range between 23 to 28µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 27 to 34µg/m<sup>3</sup> (**Table 8**).



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

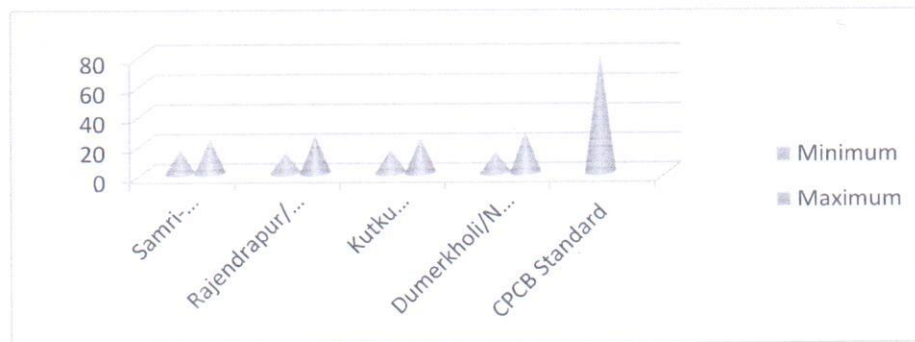
The minimum and maximum SO<sub>2</sub> concentrations were recorded as 7µg/m<sup>3</sup> and 16µg/m<sup>3</sup> respectively. The average values were observed to be in the range of 10 to 15 µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 11 to 16µg/m<sup>3</sup> (**Table 9**).

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



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

The minimum and maximum NO<sub>x</sub> concentrations were recorded as 14µg/m<sup>3</sup> and 28µg/m<sup>3</sup>. The average concentrations were ranged between 17 to 25µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 18 to 28µg/m<sup>3</sup> (**Table 10**).



### Lead (Pb)

The maximum concentrations of Lead varied 0.073µg/m<sup>3</sup> respectively. The average concentration varied 0.067µg/m<sup>3</sup> & 98<sup>th</sup> percentiles values varied 0.073µg/m<sup>3</sup> in the study region (**Table 11**).

### Mercury (Hg)

Mercury was not detected at any of the locations in SPM samples as well as RSPM Samples (**Table 12**).

### Arsenic (As)

Arsenic was not detected at any of the locations in SPM samples as well as RSPM Samples (**Table 13**).

### Chromium (Cr)

Chromium was not detected at any of the locations in SPM samples as well as RSPM Samples



### 1.7 Ambient Air Quality (Buffer Zone)

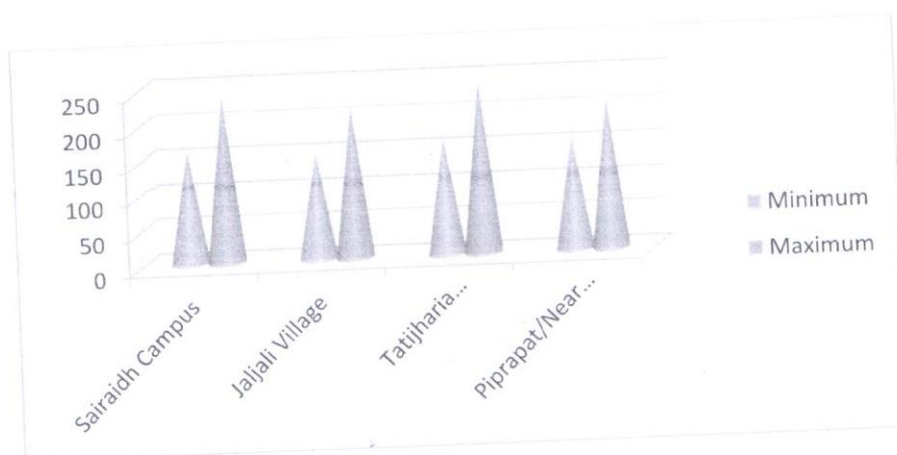
The background levels of SPM, RPM (PM<sub>10</sub>), PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, Pb, Hg, As and Cr measured are required to compute Ambient Air Quality. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, 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 July-August-September-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)/NAAQS for residential and rural zone.

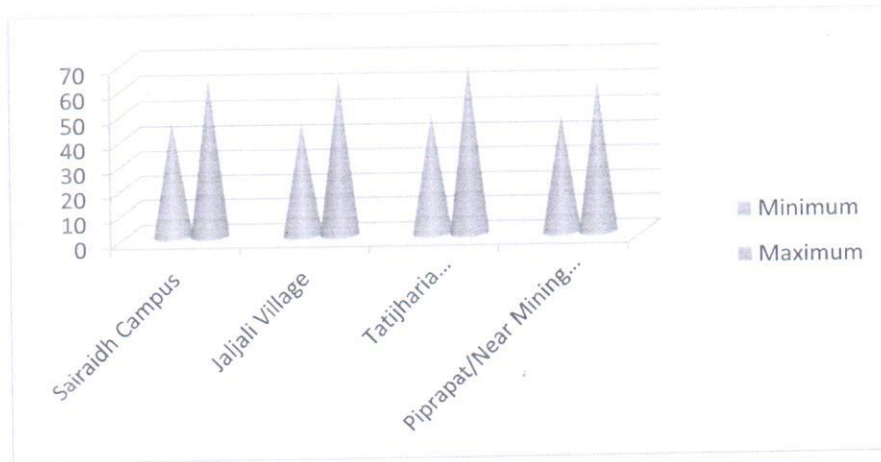
#### Suspended Particulate Matter-SPM

The statistical analysis of SPM is presented in **Table-6** for the mining area. The minimum and maximum values varied between 153 to 246µg/m<sup>3</sup> respectively during study period at all the 4 locations. The average values ranged between 168 to 222µg/m<sup>3</sup> and 98<sup>th</sup> percentile values ranged between 173 to 238µg/m<sup>3</sup> in the study area.



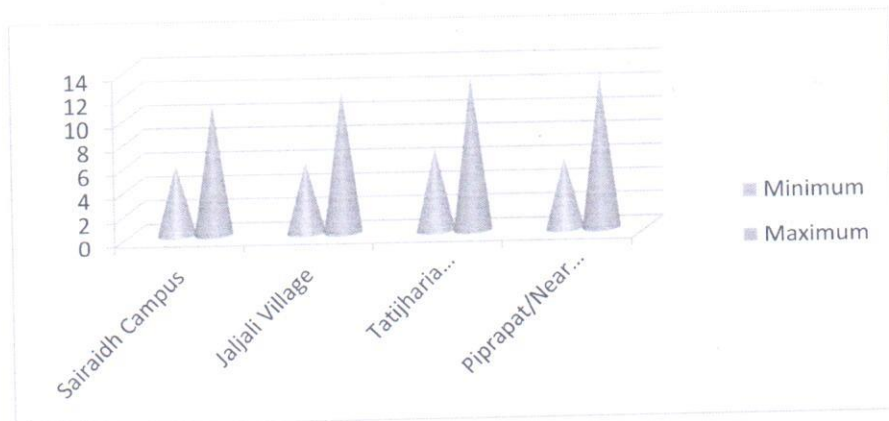
**Particulate Matter-RSPM**

The minimum and maximum values of RSPM varied between 46 to 68 $\mu\text{g}/\text{m}^3$  respectively (**Table 7**). The average values varied between 49 to 61 $\mu\text{g}/\text{m}^3$ . The 98<sup>th</sup> percentile values varied between 51 to 68 $\mu\text{g}/\text{m}^3$  in the mining area. The overall values of SPM and RSPM were well within the CPCB limits prescribe for industrial and residential area in the study area during the study period.



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

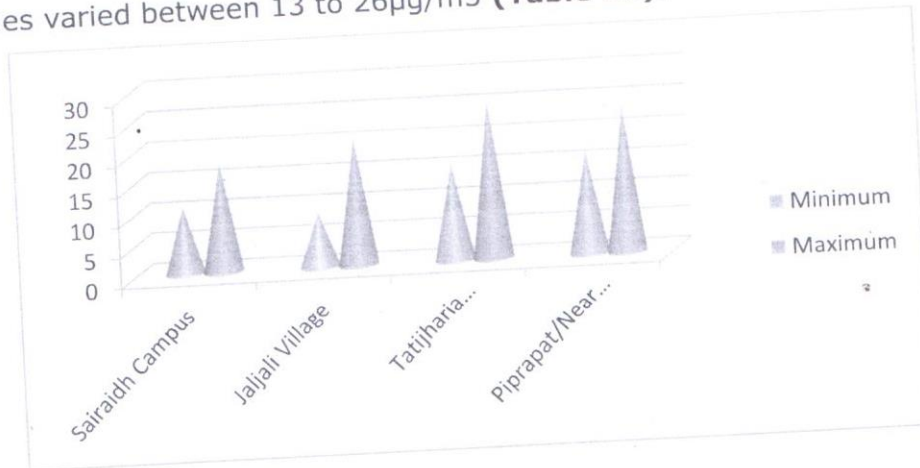
The minimum and maximum values of SO<sub>2</sub> concentrations varied between 6 to 13 $\mu\text{g}/\text{m}^3$  respectively. The average values range between 7 to 11  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values varied between 8 to 13 $\mu\text{g}/\text{m}^3$  (**Table 9**).





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

The minimum and maximum values of NO<sub>x</sub> concentrations varied between 9 to 26µg/m<sup>3</sup> respectively. The average values range between 11 to 24µg/m<sup>3</sup> and 98th percentile values varied between 13 to 26µg/m<sup>3</sup> (**Table 10**).



### Lead (Pb)

Lead was not detected at any of the locations in SPM samples as well as RSPM Samples (**Table 11**).

### Mercury (Hg)

Mercury was not detected at any of the locations in SPM samples as well as RSPM Samples (**Table 12**).

### Arsenic (As)

Arsenic was not detected at any of the locations in SPM samples as well as RSPM Samples (**Table 13**).

### Chromium (Cr)

Chromium was not detected at any of the locations in SPM samples as well as RSPM Samples.

The dust fall rate was measured by exposing a jar during July-August-September-2018 in Rajendrapur/Nr.Mining Area and Samri-Gopatu/Nr.Weigh Bridge. The dust fall rate was observed to be 22.53 and 21.58 MT/km<sup>2</sup>/month respectively as given in (**Table 14**).

Overall the ambient air concentrations of SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>, Pb, Hg, As, Cr and Dust fall 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 (July-August-September-2018) indicates that the wind was blowing predominantly from (WSW and W) directions, during study period, for 0.27 % wind was found to be calm. The graphical illustration and wind rose diagram is presented in Figures-1 & 2 respectively.

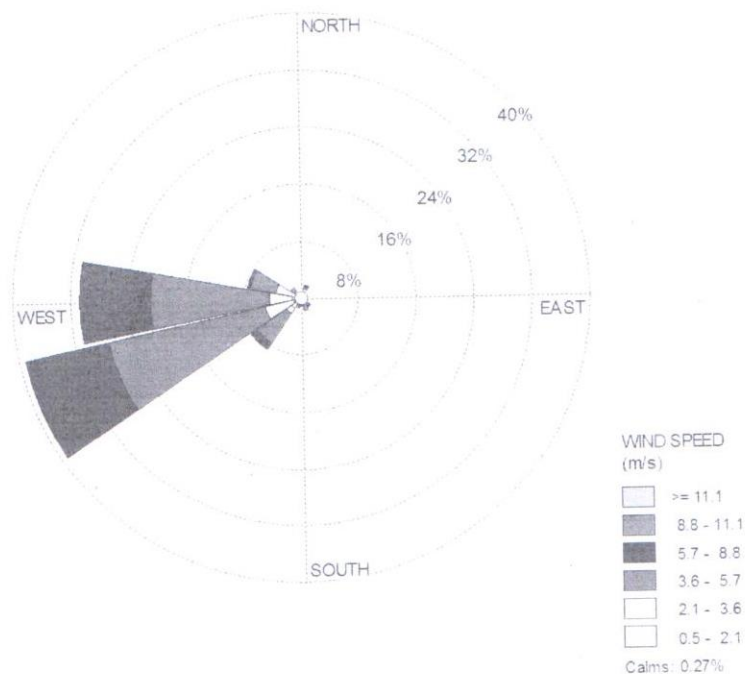
**Table.1**

**Wind Frequency Distribution Data**

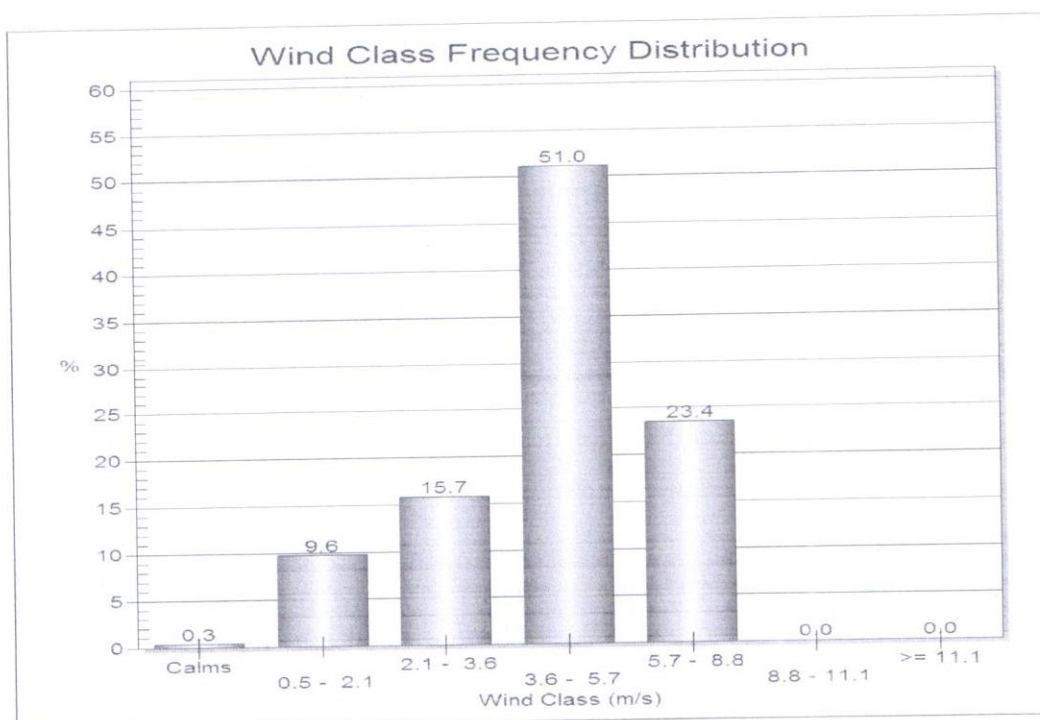
| Sr.No. | Directions / Wind Classes (m/s) | 0.5 - 2.1       | 2.1 - 3.6       | 3.6 - 5.7       | 5.7 - 8.8       | 8.8 - 11.1      | >= 11.1         | Total           |
|--------|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1      | 348.75 - 11.25                  | 0.001376        | 0.002751        | 0.001376        | 0.000000        | 0.000000        | 0.000000        | 0.005502        |
| 2      | 11.25 - 33.75                   | 0.002751        | 0.012380        | 0.002751        | 0.002751        | 0.000000        | 0.000000        | 0.020633        |
| 3      | 33.75 - 56.25                   | 0.004127        | 0.001376        | 0.000000        | 0.000000        | 0.000000        | 0.000000        | 0.005502        |
| 4      | 56.25 - 78.75                   | 0.004127        | 0.002751        | 0.000000        | 0.000000        | 0.000000        | 0.000000        | 0.006878        |
| 5      | 78.75 - 101.25                  | 0.001376        | 0.002751        | 0.001376        | 0.000000        | 0.000000        | 0.000000        | 0.005502        |
| 6      | 101.25 - 123.75                 | 0.004127        | 0.000000        | 0.001376        | 0.000000        | 0.000000        | 0.000000        | 0.005502        |
| 7      | 123.75 - 146.25                 | 0.006878        | 0.000000        | 0.008253        | 0.001376        | 0.000000        | 0.000000        | 0.016506        |
| 8      | 146.25 - 168.75                 | 0.002751        | 0.006878        | 0.009629        | 0.000000        | 0.000000        | 0.000000        | 0.019257        |
| 9      | 168.75 - 191.25                 | 0.005502        | 0.002751        | 0.004127        | 0.000000        | 0.000000        | 0.000000        | 0.012380        |
| 10     | 191.25 - 213.75                 | 0.008253        | 0.002751        | 0.004127        | 0.000000        | 0.000000        | 0.000000        | 0.015131        |
| 11     | 213.75 - 236.25                 | 0.017882        | 0.008253        | 0.049519        | 0.011004        | 0.000000        | 0.000000        | 0.086657        |
| 12     | 236.25 - 258.75                 | 0.012380        | 0.039890        | 0.221458        | 0.116919        | 0.000000        | 0.000000        | 0.390646        |
| 13     | 258.75 - 281.25                 | 0.013755        | 0.031637        | 0.163686        | 0.097662        | 0.000000        | 0.000000        | 0.306740        |
| 14     | 281.25 - 303.75                 | 0.006878        | 0.030261        | 0.035763        | 0.004127        | 0.000000        | 0.000000        | 0.077029        |
| 15     | 303.75 - 326.25                 | 0.004127        | 0.008253        | 0.006878        | 0.000000        | 0.000000        | 0.000000        | 0.019257        |
| 16     | 326.25 - 348.75                 | 0.000000        | 0.004127        | 0.000000        | 0.000000        | 0.000000        | 0.000000        | 0.004127        |
|        | <b>Sub-Total</b>                | <b>0.096286</b> | <b>0.156809</b> | <b>0.510316</b> | <b>0.233838</b> | <b>0.000000</b> | <b>0.000000</b> | <b>0.995879</b> |
|        | Calms                           |                 |                 |                 |                 |                 |                 | <b>0.002747</b> |
|        | Missing/Incomplete              |                 |                 |                 |                 |                 |                 | <b>0.001374</b> |
|        | <b>Total</b>                    |                 |                 |                 |                 |                 |                 | <b>1.000000</b> |

### SUMMARY OF WIND PATTERN

| Season             | First Predominant Wind Direction | Second Predominant Wind Direction | Calm Condition |
|--------------------|----------------------------------|-----------------------------------|----------------|
| July-Aug-Sept 2018 | WSW (39.06%)                     | W (30.67%)                        | 0.27 %         |



**Figure.01: Wind Class Frequency Distribution (July-Aug-Sept-2018).**



**Figure.02: Wind Rose Diagram (July-Aug-Sept-2018)**



### **1.9 Noise Environment**

The Director General of Mines Safety in its circular No. DG (Tech)/18 of 1975, has prescribed the noise level in mining occupations (TLV) for workers, in an 8 hour shift period with unprotected ear as 90 dB(A) or less. There will be some noise sources in mines, which produce noise levels above 90 dB(A), however, the workers are not expected to be exposed continuously for 8 hours. In order to maintain this statutory requirement Noise monitoring has been carried out in and around the mining lease area.

Work zone noise level in the mining area shall increase due to blasting and excavation, transportation. The impacts due to the mining activities on the noise levels shall be negligible, if all the precautions for the elimination of the noise are taken. The mining activities will be undertaken during daytime only. The daytime equivalent noise levels, when all the machineries are in operation, shall be minimized as if machineries have been provided with noise control equipment. Noise monitoring is carried out on monthly basis at three locations in each month are shown in (**Fig. 3**).

#### **Identification of sampling locations**

Noise at different noise generating sources has been identified based on the activities in the village area and ambient noise due to traffic.

The noise monitoring has been conducted for determination of ambient noise levels in the mining area and villages. The noise levels at each location were recorded for 24 hours.

#### **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),  $L_{eq}$ .

#### **Method of Monitoring**

Sound Pressure Level (SPL) measurements were monitored at three locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 6 am to 10 pm and night levels during 10 pm to 6 am at three locations within 10-km radius of the study area.

Noise level monitoring was carried out continuously for 24 hours with one hour interval starting at 06.00 hrs to 06.00 hrs next day.





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Noise levels monitored during day and night at 3 locations are found to be below the stipulated standard of CPCB for Industrial area as 75dB (A) and 70dB (A) for day and night respectively as given in **(Table 15)**

**2.0 Water Quality**

The existing status of water quality for ground water and surface water was assessed by collecting the water samples from underground wells from the village Samri, Kudag, Tatijhariya, Saraidih, Rajendrapur and surface water sample from Nallahs nearby Samri mines. The physico-chemical analysis of water samples collected during study period reported as average of three months given in **(Table 16)**. The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water & found to be fit for drinking purpose for tested parameters. Surface water quality is satisfactory as per IS: 10500-2012. Thus the impacts due to mining activities in each month have been found to be insignificant.



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**Table 6**  
**Statistical Analysis of SPM**

| Location                               | Month & Year   | Min. | Max. | A.M. | G.M. | Unit: $\mu\text{g}/\text{m}^3$ |
|--|----------------|------|------|------|------|--------------------------------|
|  |                |      |      |      |      | 98%ile                         |
| <b>Fugitive Emission (Core Zone):-</b> |                |      |      |      |      |                                |
| Samri-Gopatu/<br>Nr.weigh bridge       | July-2018      | 257  | 281  | 269  | 269  | 281                            |
|  | August-2018    | 294  | 316  | 305  | 305  | 316                            |
|  | September-2018 | 268  | 304  | 286  | 286  | 303                            |
| Rajendrapur/<br>Nr.Mining Area         | July-2018      | 216  | 256  | 236  | 236  | 255                            |
|  | August-2018    | 249  | 272  | 261  | 261  | 272                            |
|  | September-2018 | 234  | 269  | 252  | 252  | 268                            |
| Kutku Village/<br>Nr.V.T. Center       | July-2018      | 182  | 216  | 199  | 199  | 215                            |
|  | August-2018    | 251  | 312  | 282  | 282  | 311                            |
|  | September-2018 | 194  | 318  | 256  | 256  | 316                            |
| Dumerkholi/<br>Nr.Mining Area          | July-2018      | 276  | 307  | 292  | 292  | 306                            |
|  | August-2018    | 304  | 352  | 328  | 328  | 351                            |
|  | September-2018 | 291  | 327  | 309  | 309  | 326                            |

| Location                                      | Month & Year   | Min. | Max. | A.M. | G.M. | 98%ile |
|---|----------------|------|------|------|------|--------|
|   |                |      |      |      |      |        |
| <b>Buffer Zone :-</b>                         |                |      |      |      |      |        |
| Sairaidh<br>Campus                            | July-2018      | 164  | 216  | 190  | 190  | 215    |
|   | August-2018    | 184  | 239  | 212  | 212  | 238    |
|   | September-2018 | 168  | 227  | 198  | 198  | 226    |
| Jaljali Village                               | July-2018      | 153  | 194  | 174  | 174  | 193    |
|   | August-2018    | 167  | 206  | 187  | 187  | 205    |
|   | September-2018 | 172  | 218  | 195  | 195  | 217    |
| Tatijharia<br>Village/<br>Nr. Weigh<br>bridge | July-2018      | 168  | 204  | 186  | 186  | 203    |
|   | August-2018    | 204  | 239  | 222  | 222  | 238    |
|   | September-2018 | 217  | 246  | 232  | 232  | 245    |
| Piprapat/<br>Nr.Mining Area                   | July-2018      | 162  | 173  | 168  | 168  | 173    |
|   | August-2018    | 194  | 216  | 205  | 205  | 216    |
|   | September-2018 | 181  | 203  | 192  | 192  | 203    |

**Conclusion-A:-**

- 1) **Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone:** For the Months of July-Aug-Sept-2018 Average of SPM is  $287 \mu\text{g}/\text{m}^3$ .
- 2) **Rajendrapur/Nr.Mining Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Average of SPM is  $250 \mu\text{g}/\text{m}^3$ .
- 3) **Kutku Village / Nr.V.T. Center Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Average of SPM is  $246 \mu\text{g}/\text{m}^3$ .
- 4) **Dumerkholi/ Nr.Mining Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Average of SPM is  $310 \mu\text{g}/\text{m}^3$ .

**The Average Concentration of SPM within the core zone of Samri Lease is  $273 \mu\text{g}/\text{m}^3$ .**

**Conclusion-B:-**

1. **Sairaidh Campus Lease Area Buffer zone:-** For the Months of July-Aug-Sept-2018 Average of SPM is  $200 \mu\text{g}/\text{m}^3$ .
2. **Jaljali Village Lease Area Buffer zone:-** For the Months of July-Aug-Sept-2018 Average of SPM is  $185 \mu\text{g}/\text{m}^3$ .
3. **Tatijharia Village/ Nr. Weigh bridge Buffer zone:-** For the Months of July-Aug-Sept-2018 Average of SPM is  $213 \mu\text{g}/\text{m}^3$ .
4. **Piprapat/ Nr.Mining Area Buffer zone:-** For the Months of July-Aug-Sept-2018 Average of SPM is  $188 \mu\text{g}/\text{m}^3$ .

- **The Average Concentration of SPM within the Buffer Zone of Samri Lease is  $197 \mu\text{g}/\text{m}^3$ .**



Month-wise Summary of Statistical Analysis of SPM

3.0 Fugitive Emission (Core Zone):-

3.0.1 Presentation of Results.

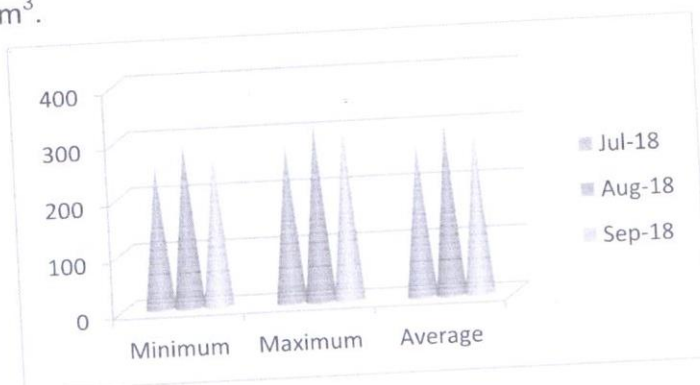
The summary of Statistical Analysis of SPM results for the month of July-August-September-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $257\mu\text{g}/\text{m}^3$  and  $281\mu\text{g}/\text{m}^3$  respectively and average concentration of  $269\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $294\mu\text{g}/\text{m}^3$  and  $316\mu\text{g}/\text{m}^3$  respectively and average concentration of  $305\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $268\mu\text{g}/\text{m}^3$  and  $304\mu\text{g}/\text{m}^3$  respectively and average concentration of  $286\mu\text{g}/\text{m}^3$ .



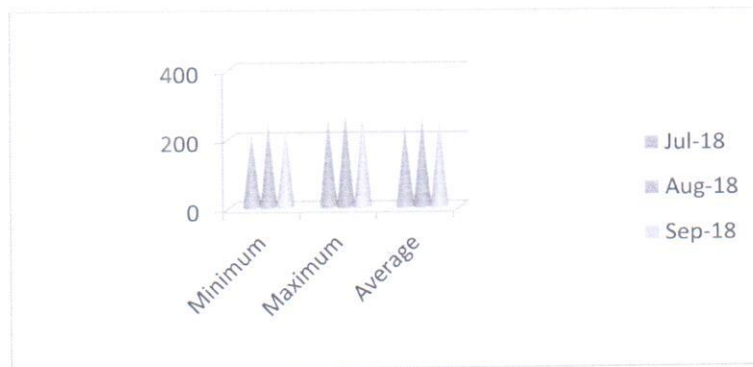
Graph :- Samri-Gopatu/ Nr.weigh bridge

**Rajendrapur/ Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $216\mu\text{g}/\text{m}^3$  and  $256\mu\text{g}/\text{m}^3$  respectively and average concentration of  $236\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $249\mu\text{g}/\text{m}^3$  and  $272\mu\text{g}/\text{m}^3$  respectively and average concentration of  $261\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $234\mu\text{g}/\text{m}^3$  and  $269\mu\text{g}/\text{m}^3$  respectively and average concentration of  $252\mu\text{g}/\text{m}^3$ .



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

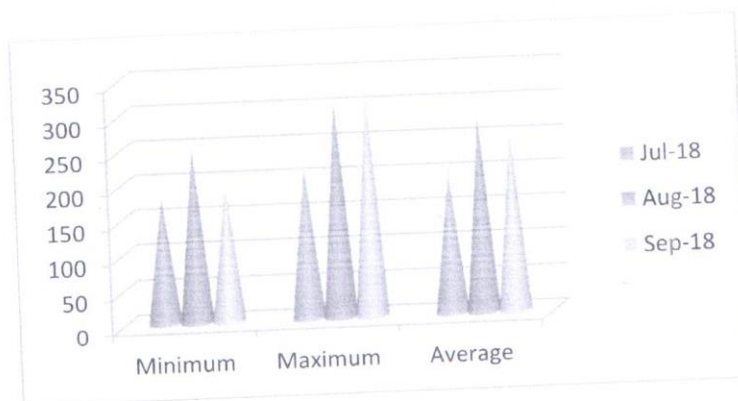


**Kutku Village/ Nr.V.T. Center**

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $182\mu\text{g}/\text{m}^3$  and  $216\mu\text{g}/\text{m}^3$  respectively and average concentration of  $199\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $251\mu\text{g}/\text{m}^3$  and  $312\mu\text{g}/\text{m}^3$  respectively and average concentration of  $282\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $194\mu\text{g}/\text{m}^3$  and  $318\mu\text{g}/\text{m}^3$  respectively and average concentration of  $256\mu\text{g}/\text{m}^3$ .



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

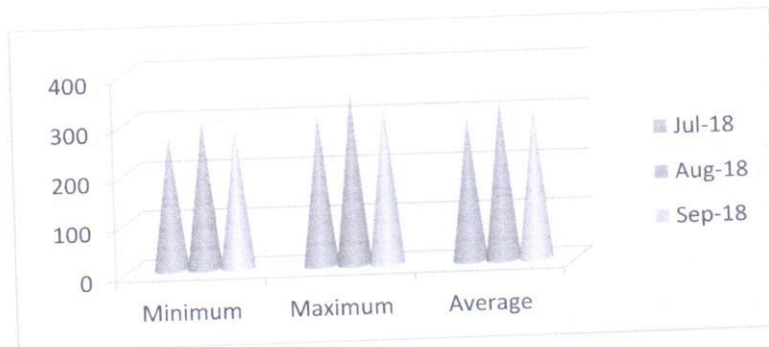


**Dumerkholi/ Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $276\mu\text{g}/\text{m}^3$  and  $307\mu\text{g}/\text{m}^3$  respectively and average concentration of  $292\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $304\mu\text{g}/\text{m}^3$  and  $352\mu\text{g}/\text{m}^3$  respectively and average concentration of  $328\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $291\mu\text{g}/\text{m}^3$  and  $327\mu\text{g}/\text{m}^3$  respectively and average concentration of  $309\mu\text{g}/\text{m}^3$ .



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

### 3.1 Fugitive Emission (Buffer Zone):-

#### 3.1.1 Presentation of Results.

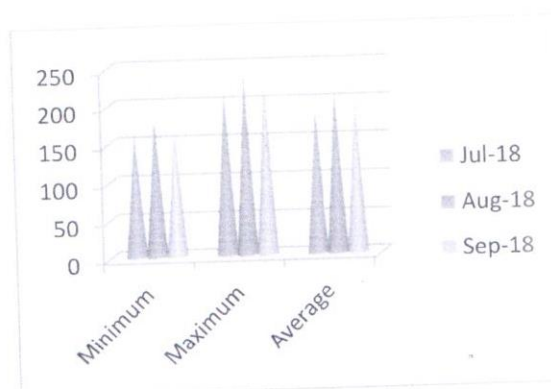
The summary of Statistical Analysis of SPM results for the month of July-August-September-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $164\mu\text{g}/\text{m}^3$  and  $216\mu\text{g}/\text{m}^3$  respectively and average concentration of  $190\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $184\mu\text{g}/\text{m}^3$  and  $239\mu\text{g}/\text{m}^3$  respectively and average concentration of  $212\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $168\mu\text{g}/\text{m}^3$  and  $227\mu\text{g}/\text{m}^3$  respectively and average concentration of  $198\mu\text{g}/\text{m}^3$ .



**Graph:- Sairaidh Campus**

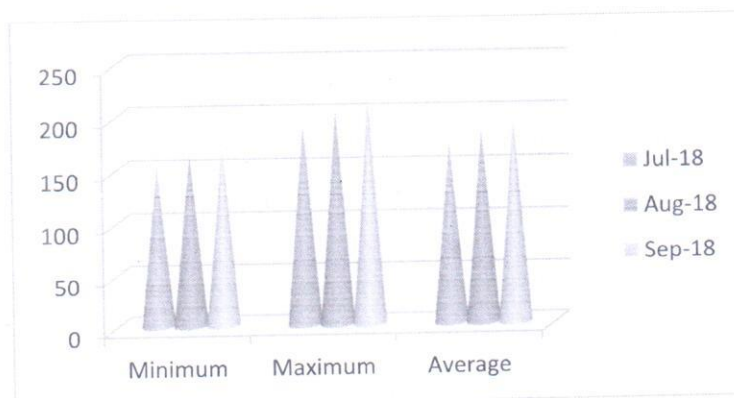


**Jaljali Village**

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $153\mu\text{g}/\text{m}^3$  and  $194\mu\text{g}/\text{m}^3$  respectively and average concentration of  $174\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $167\mu\text{g}/\text{m}^3$  and  $206\mu\text{g}/\text{m}^3$  respectively and average concentration of  $187\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $172\mu\text{g}/\text{m}^3$  and  $218\mu\text{g}/\text{m}^3$  respectively and average concentration of  $195\mu\text{g}/\text{m}^3$ .



**Graph:- Jaljali Village**

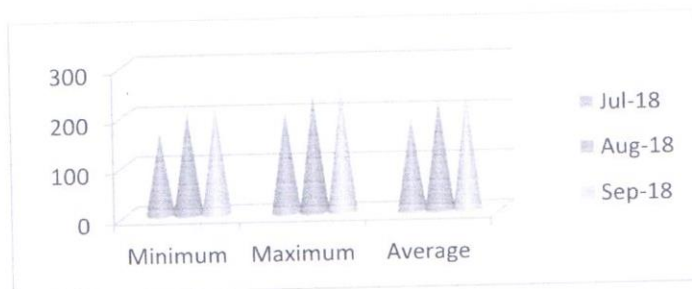


**Tatijharia Village/Nr.Weigh Bridge**

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $168\mu\text{g}/\text{m}^3$  and  $204\mu\text{g}/\text{m}^3$  respectively and average concentration of  $186\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $204\mu\text{g}/\text{m}^3$  and  $239\mu\text{g}/\text{m}^3$  respectively and average concentration of  $222\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $217\mu\text{g}/\text{m}^3$  and  $246\mu\text{g}/\text{m}^3$  respectively and average concentration of  $232\mu\text{g}/\text{m}^3$ .



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

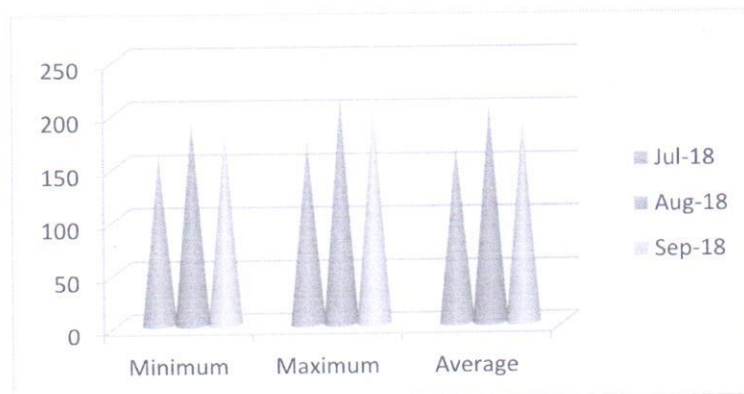


**Piprapat/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as  $162\mu\text{g}/\text{m}^3$  and  $173\mu\text{g}/\text{m}^3$  respectively and average concentration of  $168\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as  $194\mu\text{g}/\text{m}^3$  and  $216\mu\text{g}/\text{m}^3$  respectively and average concentration of  $205\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as  $181\mu\text{g}/\text{m}^3$  and  $203\mu\text{g}/\text{m}^3$  respectively and average concentration of  $192\mu\text{g}/\text{m}^3$ .



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



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**Table 7**  
**Statistical Analysis of RSPM**

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

| Location                               | Month & Year   | Min.                          | Max. | A.M. | G.M. | 98%ile |
|--|----------------|-------------------------------|------|------|------|--------|
| <b>Fugitive Emission (Core Zone):-</b> |                |                               |      |      |      |        |
| Samri-Gopatu/<br>Nr.weigh bridge       | July-2018      | 57                            | 71   | 64   | 64   | 71     |
|  | August-2018    | 61                            | 76   | 69   | 69   | 76     |
|  | September-2018 | 59                            | 68   | 64   | 64   | 68     |
| Rajendrapur/<br>Nr.Mining Area         | July-2018      | 54                            | 62   | 58   | 58   | 62     |
|  | August-2018    | 61                            | 73   | 67   | 67   | 73     |
|  | September-2018 | 58                            | 67   | 63   | 63   | 67     |
| Kutku Village/<br>Nr.V.T. Center       | July-2018      | 54                            | 68   | 61   | 61   | 68     |
|  | August-2018    | 61                            | 73   | 67   | 67   | 73     |
|  | September-2018 | 58                            | 71   | 65   | 65   | 71     |
| Dumerkholi/<br>Nr.Mining Area          | July-2018      | 61                            | 76   | 69   | 69   | 76     |
|  | August-2018    | 72                            | 81   | 77   | 77   | 81     |
|  | September-2018 | 68                            | 73   | 71   | 71   | 73     |
| <b>CPCB Standard</b>                   |                | <b>100</b><br><b>(24 hrs)</b> |      |      |      |        |

| Location                                | Month & Year   | Min.                          | Max. | A.M. | G.M. | 98%ile |
|---|----------------|-------------------------------|------|------|------|--------|
| <b>Buffer Zone :-</b>                   |                |                               |      |      |      |        |
| Sairaidh Campus                         | July-2018      | 47                            | 56   | 52   | 52   | 56     |
|   | August-2018    | 53                            | 64   | 59   | 59   | 64     |
|   | September-2018 | 51                            | 58   | 55   | 55   | 58     |
| Jaljali Village                         | July-2018      | 46                            | 51   | 49   | 49   | 51     |
|   | August-2018    | 51                            | 64   | 58   | 58   | 64     |
|   | September-2018 | 48                            | 57   | 53   | 53   | 57     |
| Tatijharia Village/<br>Nr. Weigh bridge | July-2018      | 54                            | 68   | 61   | 61   | 68     |
|   | August-2018    | 49                            | 56   | 53   | 53   | 56     |
|   | September-2018 | 51                            | 58   | 55   | 55   | 58     |
| Piprapat/<br>Nr.Mining Area             | July-2018      | 48                            | 53   | 51   | 51   | 53     |
|   | August-2018    | 51                            | 61   | 56   | 56   | 61     |
|   | September-2018 | 48                            | 57   | 53   | 53   | 57     |
| <b>CPCB Standard</b>                    |                | <b>100</b><br><b>(24 hrs)</b> |      |      |      |        |

**Conclusion: A)**

- 1) **Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone:** For the Months of July-Aug-Sept-2018 Average of RSPM is  $66 \mu\text{g}/\text{m}^3$ .
- 2) **Rajendrapur/Nr.Mining Area Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Average of RSPM is  $63 \mu\text{g}/\text{m}^3$ .
- 3) **Kutku Village / Nr.V.T. Center Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Average of RSPM is  $64 \mu\text{g}/\text{m}^3$ .
- 4) **Dumerkholi/ Nr.Mining Area Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Average of RSPM is  $72 \mu\text{g}/\text{m}^3$ .

• The Average Concentration of RSPM within the Core Zone of Samri Lease is  $66 \mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

• **Conclusion (B)**

- 1) **Sairaidh Campus Lease Area Buffer Zone:-** For the Months of July-Aug-Sept-2018 Average of RSPM is  $55 \mu\text{g}/\text{m}^3$ .
- 2) **Jaljali Village Lease Area Buffer Zone:-** For the Months of July-Aug-Sept-2018 Average of RSPM is  $53 \mu\text{g}/\text{m}^3$ .
- 3) **Tatijharia Village/ Nr. Weigh bridge Buffer Zone:-** For the Months of July-Aug-Sept-2018 Average of RSPM is  $56 \mu\text{g}/\text{m}^3$ .
- 4) **Piprapat/ Nr.Mining Area Buffer Zone:-** For the Months of July-Aug-Sept-2018 Average of RSPM is  $53 \mu\text{g}/\text{m}^3$ .

• The Average Concentration of RSPM within the Buffer Zone of Samri Lease is  $55 \mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.



Monthwise Summary of Statistical Analysis of RSPM

3.2 Fugitive Emission (Core Zone):-

3.2.1 Presentation of Results.

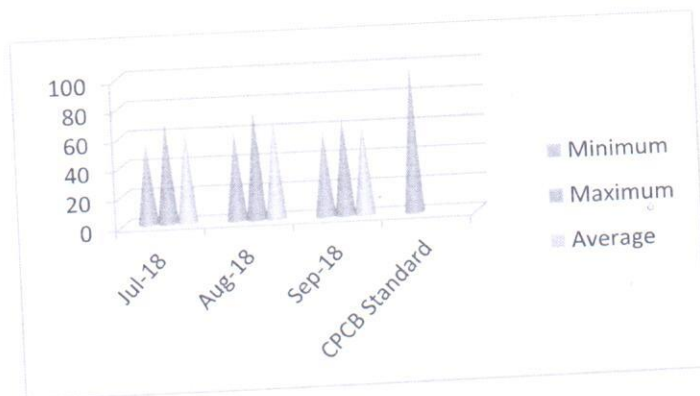
The summary of Statistical Analysis of RSPM results for the month of July-August-September-2018 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $57\mu\text{g}/\text{m}^3$  and  $71\mu\text{g}/\text{m}^3$  respectively and average concentration of  $64\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $76\mu\text{g}/\text{m}^3$  respectively and average concentration of  $69\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $59\mu\text{g}/\text{m}^3$  and  $68\mu\text{g}/\text{m}^3$  respectively and average concentration of  $64\mu\text{g}/\text{m}^3$ .



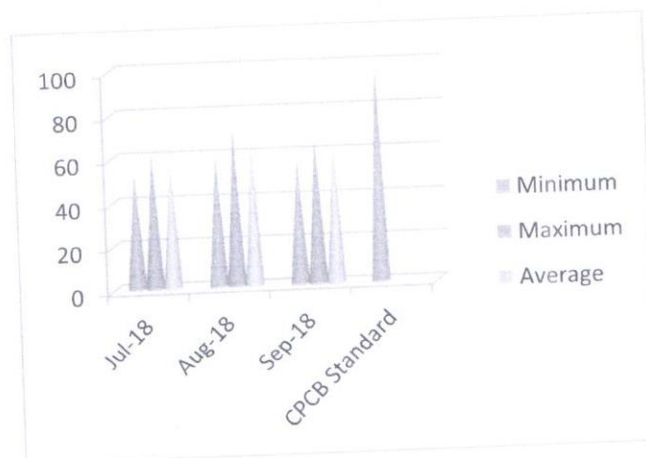


**Rajendrapur/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $54\mu\text{g}/\text{m}^3$  and  $62\mu\text{g}/\text{m}^3$  respectively and average concentration of  $58\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $73\mu\text{g}/\text{m}^3$  respectively and average concentration of  $67\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $58\mu\text{g}/\text{m}^3$  and  $67\mu\text{g}/\text{m}^3$  respectively and average concentration of  $63\mu\text{g}/\text{m}^3$ .



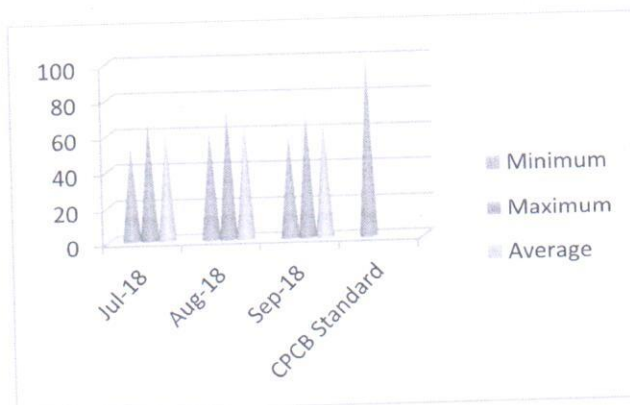


**Kutku Village/Nr.V.T. Center**

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $54\mu\text{g}/\text{m}^3$  and  $68\mu\text{g}/\text{m}^3$  respectively and average concentration of  $61\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $73\mu\text{g}/\text{m}^3$  respectively and average concentration of  $67\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $58\mu\text{g}/\text{m}^3$  and  $71\mu\text{g}/\text{m}^3$  respectively and average concentration of  $65\mu\text{g}/\text{m}^3$ .



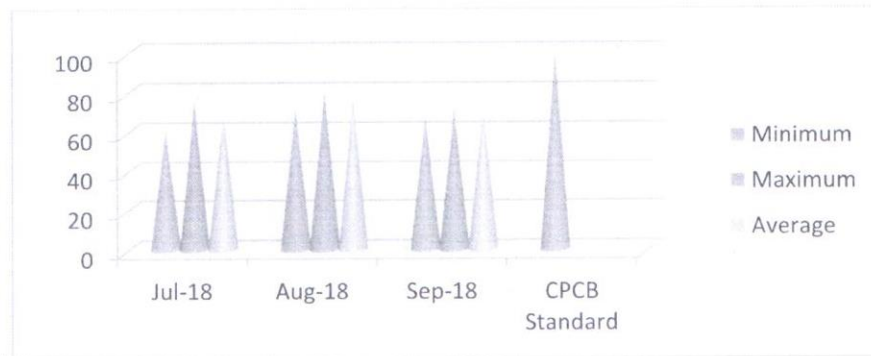


**Dumerkholi/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $76\mu\text{g}/\text{m}^3$  respectively and average concentration of  $69\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $72\mu\text{g}/\text{m}^3$  and  $81\mu\text{g}/\text{m}^3$  respectively and average concentration of  $77\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $68\mu\text{g}/\text{m}^3$  and  $73\mu\text{g}/\text{m}^3$  respectively and average concentration of  $71\mu\text{g}/\text{m}^3$ .





### 3.3 Fugitive Emission (Buffer Zone):-

#### 3.3.1 Presentation of Results.

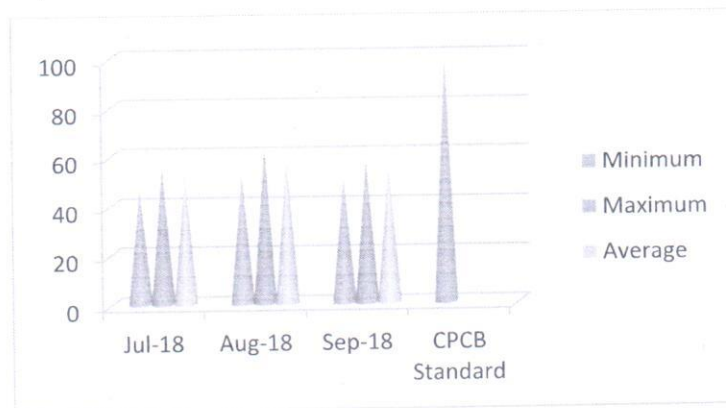
The summary of Statistical Analysis of RSPM results for the month of July-August-September-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $47\mu\text{g}/\text{m}^3$  and  $56\mu\text{g}/\text{m}^3$  respectively and average concentration of  $52\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $53\mu\text{g}/\text{m}^3$  and  $64\mu\text{g}/\text{m}^3$  respectively and average concentration of  $59\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $51\mu\text{g}/\text{m}^3$  and  $58\mu\text{g}/\text{m}^3$  respectively and average concentration of  $55\mu\text{g}/\text{m}^3$ .





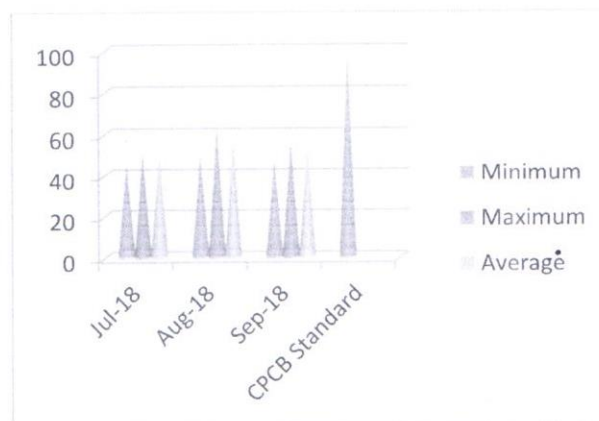


**Jaljali Village**

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $46\mu\text{g}/\text{m}^3$  and  $51\mu\text{g}/\text{m}^3$  respectively and average concentration of  $49\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $51\mu\text{g}/\text{m}^3$  and  $64\mu\text{g}/\text{m}^3$  respectively and average concentration of  $58\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $48\mu\text{g}/\text{m}^3$  and  $57\mu\text{g}/\text{m}^3$  respectively and average concentration of  $53\mu\text{g}/\text{m}^3$ .



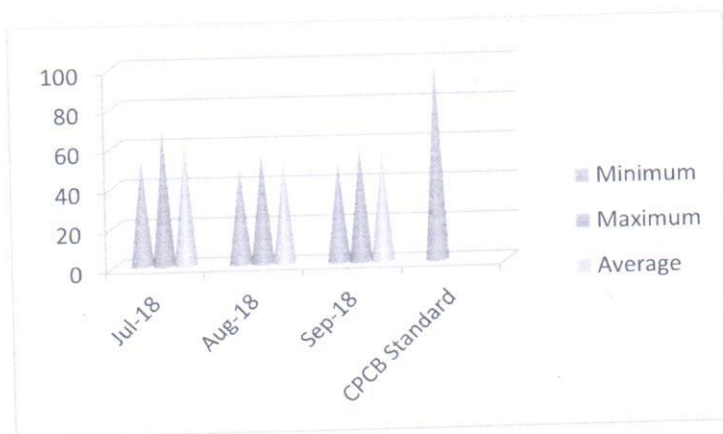


**Tatijharia Village**

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $54\mu\text{g}/\text{m}^3$  and  $68\mu\text{g}/\text{m}^3$  respectively and average concentration of  $61\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $49\mu\text{g}/\text{m}^3$  and  $56\mu\text{g}/\text{m}^3$  respectively and average concentration of  $53\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $51\mu\text{g}/\text{m}^3$  and  $58\mu\text{g}/\text{m}^3$  respectively and average concentration of  $55\mu\text{g}/\text{m}^3$ .



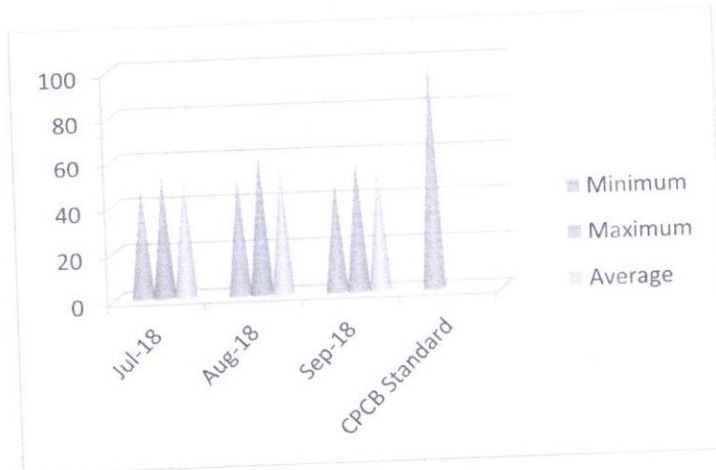


**Piprapat/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as  $48\mu\text{g}/\text{m}^3$  and  $53\mu\text{g}/\text{m}^3$  respectively and average concentration of  $51\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as  $51\mu\text{g}/\text{m}^3$  and  $61\mu\text{g}/\text{m}^3$  respectively and average concentration of  $56\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as  $48\mu\text{g}/\text{m}^3$  and  $57\mu\text{g}/\text{m}^3$  respectively and average concentration of  $53\mu\text{g}/\text{m}^3$ .





**Table 8**

**Statistical Analysis of PM 2.5**

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

| Location                           | Month & Year   | Min.                         | Max. | A.M. | G.M. | 98% |
|------------------------------------|----------------|------------------------------|------|------|------|-----|
| Samri-Gopatu/<br>Near Weigh bridge | July-2018      | 18                           | 27   | 23   | 23   | 27  |
|                                    | August-2018    | 21                           | 34   | 28   | 28   | 34  |
|                                    | September-2018 | 19                           | 32   | 26   | 26   | 32  |
| <b>CPCB Standard</b>               |                | <b>60</b><br><b>(24 hrs)</b> |      |      |      |     |

**Conclusion :-** The Average Concentration of  $\text{PM}_{2.5}$  within Samri Lease during this period (July-Aug-Sept-2018) is  $26 \mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**3.4 Statistical Analysis of PM 2.5:-**

**3.4.1 Presentation of Results.**

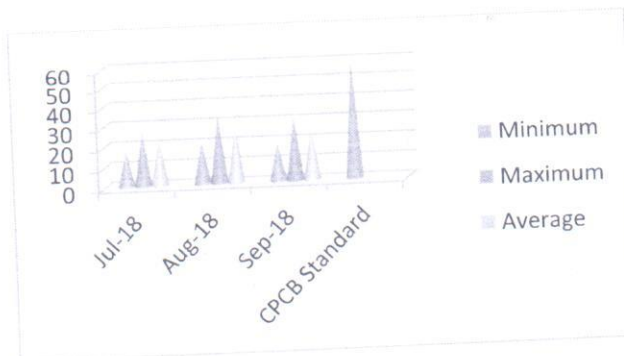
The summary of Statistical Analysis of  $\text{PM}_{2.5}$  results for the month of July-August-September-2018 are presented in detail in Table 8. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Samri-Gopatu/Near Weigh Bridge**

For the month of July-2018 the minimum and maximum concentrations for  $\text{PM}_{2.5}$  were recorded as  $18 \mu\text{g}/\text{m}^3$  and  $27 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $23 \mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for  $\text{PM}_{2.5}$  were recorded as  $21 \mu\text{g}/\text{m}^3$  and  $34 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $28 \mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for  $\text{PM}_{2.5}$  were recorded as  $19 \mu\text{g}/\text{m}^3$  and  $32 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $26 \mu\text{g}/\text{m}^3$ .





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**Table 9**

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

Unit: µg/m<sup>3</sup>

| Location                               | Month & Year   | Min.                         | Max. | A.M. | G.M. | 98% |
|--|----------------|------------------------------|------|------|------|-----|
| <b>Fugitive Emission (Core Zone):-</b> |                |                              |      |      |      |     |
| Samri-Gopatu/<br>Nr.weigh bridge       | July-2018      | 11                           | 13   | 12   | 12   | 13  |
|  | August-2018    | 13                           | 16   | 15   | 15   | 16  |
|  | September-2018 | 11                           | 14   | 13   | 13   | 14  |
| Rajendrapur/<br>Nr.Mining Area         | July-2018      | 9                            | 13   | 11   | 11   | 13  |
|  | August-2018    | 11                           | 16   | 14   | 14   | 16  |
|  | September-2018 | 12                           | 14   | 13   | 13   | 14  |
| Kutku Village/<br>Nr.V.T. Center       | July-2018      | 8                            | 11   | 10   | 10   | 11  |
|  | August-2018    | 11                           | 16   | 14   | 14   | 16  |
|  | September-2018 | 9                            | 13   | 11   | 11   | 13  |
| Dumerkholi/<br>Nr.Mining Area          | July-2018      | 7                            | 12   | 10   | 10   | 12  |
|  | August-2018    | 11                           | 16   | 14   | 14   | 16  |
|  | September-2018 | 9                            | 14   | 12   | 12   | 14  |
| <b>CPCB Standard</b>                   |                | <b>80</b><br><b>(24 hrs)</b> |      |      |      |     |

| Location                                | Month & Year   | Min.                         | Max. | A.M. | G.M. | 98% |
|---|----------------|------------------------------|------|------|------|-----|
| <b>Buffer Zone :-</b>                   |                |                              |      |      |      |     |
| Sairaidh Campus                         | July-2018      | 6                            | 8    | 7    | 7    | 8   |
|   | August-2018    | 9                            | 11   | 10   | 10   | 11  |
|   | September-2018 | 7                            | 9    | 8    | 8    | 9   |
| Jaljali Village                         | July-2018      | 6                            | 11   | 9    | 9    | 11  |
|   | August-2018    | 8                            | 12   | 10   | 10   | 12  |
|   | September-2018 | 6                            | 9    | 8    | 8    | 9   |
| Tatijharia Village/<br>Nr. Weigh bridge | July-2018      | 7                            | 11   | 9    | 9    | 11  |
|   | August-2018    | 9                            | 13   | 11   | 11   | 13  |
|   | September-2018 | 7                            | 12   | 10   | 10   | 12  |
| Piprapat/<br>Nr.Mining Area             | July-2018      | 6                            | 9    | 8    | 8    | 9   |
|   | August-2018    | 9                            | 13   | 11   | 11   | 13  |
|   | September-2018 | 7                            | 12   | 10   | 10   | 12  |
| <b>CPCB Standard</b>                    |                | <b>80</b><br><b>(24 hrs)</b> |      |      |      |     |

**Conclusion:- A)**

- 1) **Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone:** For the Months of July-Aug-Sept-2018 Avg. of SO<sub>2</sub> is 13 µg/m<sup>3</sup>.
  - 2) **Rajendrapur/Nr.Mining Area Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Avg. of SO<sub>2</sub> is 13 µg/m<sup>3</sup>.
  - 3) **Kutku Village / Nr.V.T. Center Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Avg. of SO<sub>2</sub> is 12 µg/m<sup>3</sup>.
  - 4) **Dumerkholi/ Nr.Mining Area Core Zone:-** For the Months of July-Aug-Sept-2018 Average of SO<sub>2</sub> is 12 µg/m<sup>3</sup>.
- The Average Concentration of SO<sub>2</sub> within the Core Zone of Samri Lease during this period (July-Aug-Sept-2018) is 12 µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.

**Conclusion : B)**

- 1) **Sairaidh Campus Lease Area Buffer Zone:-** For the Months of July-Aug-Sept-2018 Average of SO<sub>2</sub> is 8 µg/m<sup>3</sup>.
  - 2) **Jaljali Village Lease Area Buffer Zone:-** For the Months of July-Aug-Sept-2018 Average of SO<sub>2</sub> is 9 µg/m<sup>3</sup>.
  - 3) **Tatijharia Village/ Nr. Weigh bridge Lease Area Buffer Zone:-** For the Months of July-Aug-Sept-2018 Avg. of SO<sub>2</sub> is 10 µg/m<sup>3</sup>.
  - 4) **Piprapat/ Nr.Mining Lease Area Buffer Zone:-** For the Months of July-Aug-Sept-2018 Average of SO<sub>2</sub> is 10 µg/m<sup>3</sup>.
- The Average Concentration of SO<sub>2</sub> within the Buffer Zone of Samri Lease during this period (July-Aug-Sept-2018) is 9 µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.



**Monthwise Summary of Statistical Analysis of SO<sub>2</sub>**

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

**3.5.1 Presentation of Results.**

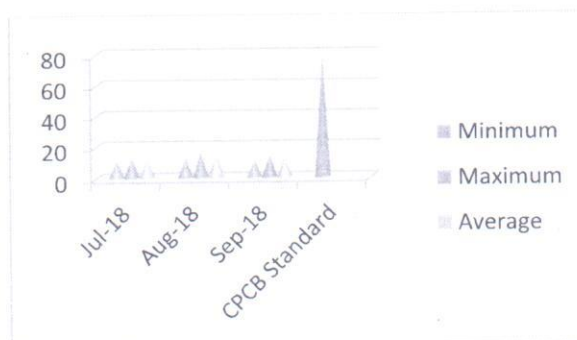
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of July-August-September-2018 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Samri-Gopatu/ Nr.weigh bridge**

For the month of July-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 11µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 12µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 13µg/m<sup>3</sup> and 16µg/m<sup>3</sup> respectively and average concentration of 15µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 11µg/m<sup>3</sup> and 14µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.



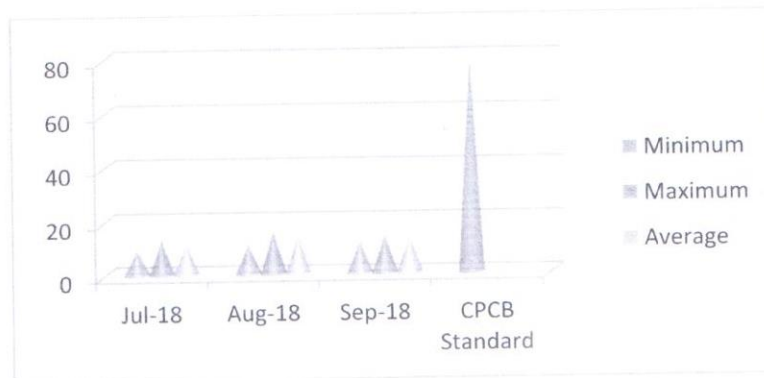


**Rajendrapur/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for SO<sub>2</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>.

For the month of September-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 12µg/m<sup>3</sup> and 14µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.



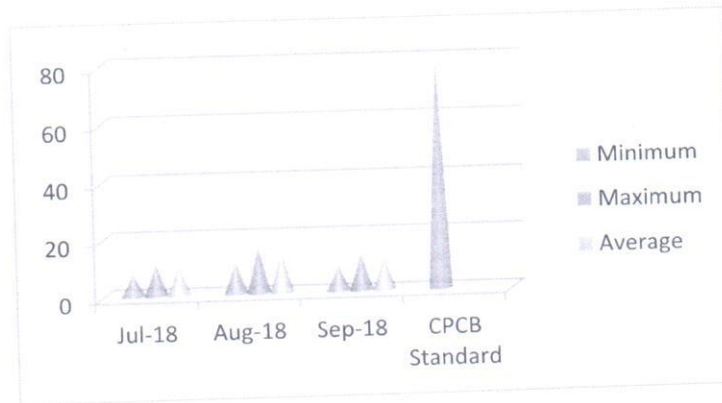


**Kutku Village/Nr.V.T. Center**

For the month of July-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 August-2018 the minimum and maximum concentrations for SO<sub>2</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>.

For the month of September-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.







**Dumerkholi/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 10µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for SO<sub>2</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>.

For the month of September-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 14µg/m<sup>3</sup> respectively and average concentration of 12µg/m<sup>3</sup>.





### 3.6 Fugitive Emission (Buffer Zone):-

#### 3.6.1 Presentation of Results.

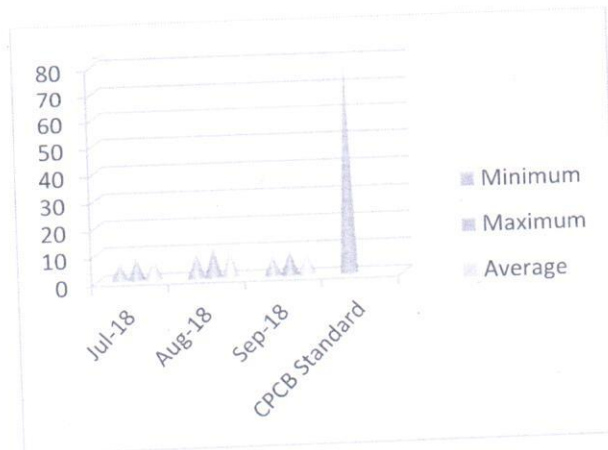
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of July-August-September-2018 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6µg/m<sup>3</sup> and 8µg/m<sup>3</sup> respectively and average concentration of 7µg/m<sup>3</sup>.

For the month of August-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 September-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>.



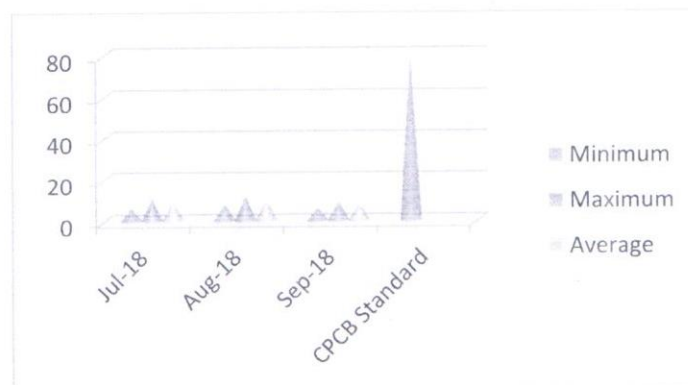


**Jaljali Village**

For the month of July-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6µg/m<sup>3</sup> and 11µg/m<sup>3</sup> respectively and average concentration of 9µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 10µg/m<sup>3</sup>.

For the month of September-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>.



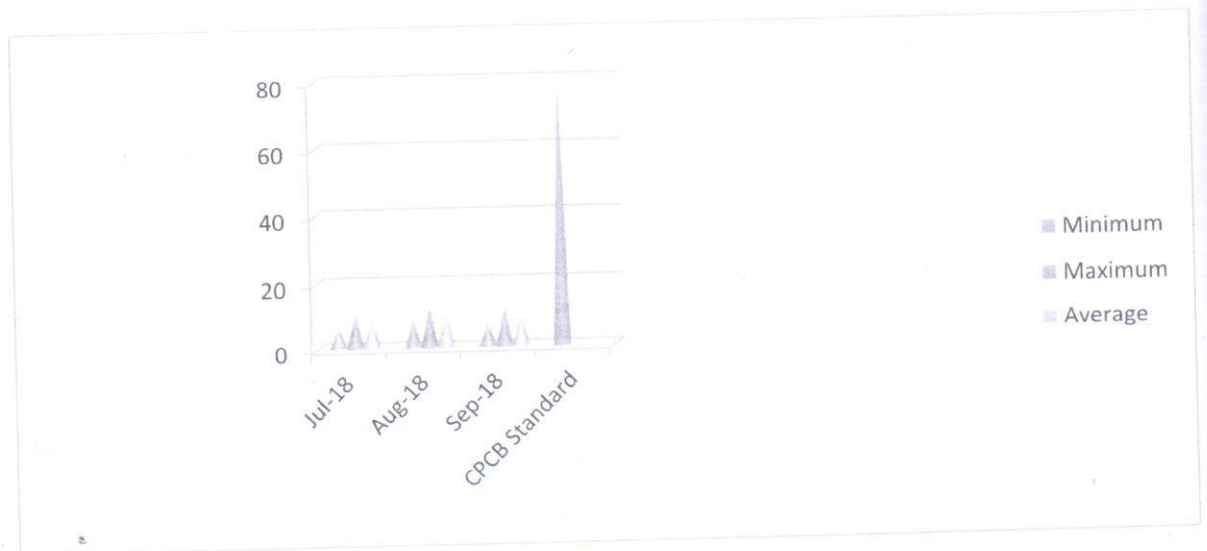


**Tatijharia Village/Nr.Weigh Bridge**

For the month of July-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7µg/m<sup>3</sup> and 11µg/m<sup>3</sup> respectively and average concentration of 9µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 10µg/m<sup>3</sup>.



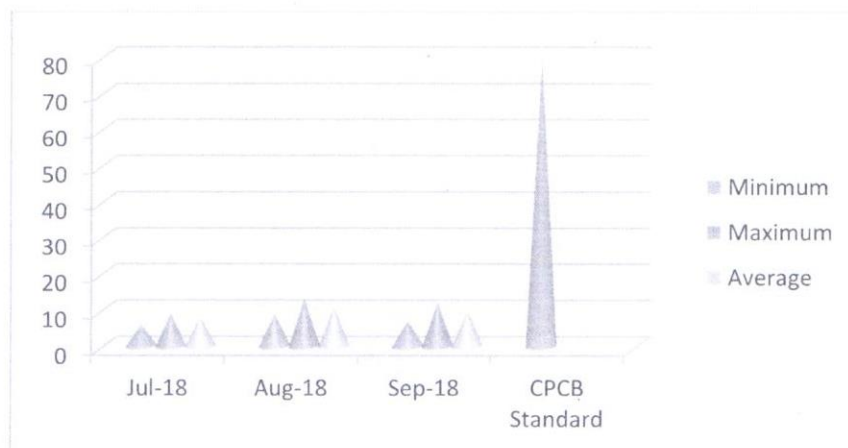


**Piprapat/Nr.Mining Area**

For the month of July-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>.

For the month of August-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 10µg/m<sup>3</sup>.





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**Table 10**  
**Statistical Analysis of NO<sub>x</sub>**

| Location                               | Month & Year   | Min.           | Max. | Unit: µg/m <sup>3</sup> |      | 98% |
|--|----------------|----------------|------|-------------------------|------|-----|
|  |                |                |      | A.M.                    | G.M. |     |
| <b>Fugitive Emission (Core Zone):-</b> |                |                |      |                         |      |     |
| Samri-Gopatu/<br>Nr.weigh bridge       | July-2018      | 16             | 18   | 17                      | 17   | 18  |
|  | August-2018    | 19             | 24   | 22                      | 22   | 24  |
|  | September-2018 | 18             | 19   | 19                      | 19   | 19  |
| Rajendrapur/<br>Nr.Mining Area         | July-2018      | 14             | 21   | 18                      | 18   | 21  |
|  | August-2018    | 16             | 24   | 20                      | 20   | 24  |
|  | September-2018 | 17             | 26   | 22                      | 22   | 26  |
| Kutku Village/<br>Nr.V.T. Center       | July-2018      | 16             | 18   | 17                      | 17   | 18  |
|  | August-2018    | 21             | 24   | 23                      | 23   | 24  |
|  | September-2018 | 17             | 21   | 19                      | 19   | 21  |
| Dumerkholi/<br>Nr.Mining Area          | July-2018      | 14             | 19   | 17                      | 17   | 19  |
|  | August-2018    | 18             | 23   | 21                      | 21   | 23  |
|  | September-2018 | 21             | 28   | 25                      | 25   | 28  |
| CPCB Standard                          |                | 80<br>(24 hrs) |      |                         |      |     |

| Location                                | Month & Year   | Min.           | Max. | A.M. |    | G.M. |    | 98% |
|---|----------------|----------------|------|------|----|------|----|-----|
|   |                |                |      |      |    |      |    |     |
| <b>Buffer Zone :-</b>                   |                |                |      |      |    |      |    |     |
| Sairaidh Campus                         | July-2018      | 12             | 16   | 14   | 14 | 14   | 14 | 16  |
|   | August-2018    | 11             | 14   | 13   | 13 | 13   | 13 | 14  |
|   | September-2018 | 13             | 18   | 16   | 16 | 16   | 16 | 18  |
| Jaljali Village                         | July-2018      | 9              | 13   | 11   | 11 | 11   | 11 | 13  |
|   | August-2018    | 12             | 18   | 15   | 15 | 15   | 15 | 18  |
|   | September-2018 | 14             | 21   | 18   | 18 | 18   | 18 | 21  |
| Tatijharia Village/<br>Nr. Weigh bridge | July-2018      | 18             | 23   | 21   | 21 | 21   | 21 | 23  |
|   | August-2018    | 16             | 19   | 18   | 18 | 18   | 18 | 19  |
|   | September-2018 | 21             | 26   | 24   | 24 | 24   | 24 | 26  |
| Piprapat/<br>Nr.Mining Area             | July-2018      | 17             | 21   | 19   | 19 | 19   | 19 | 21  |
|   | August-2018    | 19             | 24   | 22   | 22 | 22   | 22 | 24  |
|   | September-2018 | 17             | 23   | 20   | 20 | 20   | 20 | 23  |
| CPCB Standard                           |                | 80<br>(24 hrs) |      |      |    |      |    |     |

**Conclusion: A)**

- 1) Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone: For the Months of July-August-Sept-2018 Average of NO<sub>x</sub> is 19 µg/m<sup>3</sup>.
  - 2) Rajendrapur/Nr.Mining Lease Area Core Zone:- For the Months of July-August-Sept-2018 Average of NO<sub>x</sub> is 20 µg/m<sup>3</sup>.
  - 3) Kutku Village / Nr.V.T. Center Lease Area Core Zone:- For the Months of July-August-Sept-2018 Average of NO<sub>x</sub> is 20 µg/m<sup>3</sup>.
  - 4) Dumerkholi/ Nr.Mining Lease Area Core Zone:- For the Months of July-August-Sept-2018 of NO<sub>x</sub> is 21 µg/m<sup>3</sup>.
- The Average Concentration of NO<sub>x</sub> within the Core Zone of Samri Lease during this period (July-August-Sept-2018) is 20 µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.

**Conclusion: B)**

- 1)Sairaidh Campus Lease Area Buffer Zone:- For the Months of July-August-Sept-2018 Average of NO<sub>x</sub> is 14 µg/m<sup>3</sup>.
  - 2)Jaljali VillageLease Area Buffer Zone:- For the Months of July-August-Sept-2018 Average of NO<sub>x</sub> is 15 µg/m<sup>3</sup>.
  - 3)Tatijharia Village/ Nr. Weigh bridge Lease Area Buffer Zone:- For the Months of July-August-Sept-2018 Average of NO<sub>x</sub> is 21 µg/m<sup>3</sup>.
  - 4) Piprapat/ Nr.Mining Lease Area Buffer Zone:- For the Months of July-August-Sept-2018 Average of NO<sub>x</sub> is 20 µg/m<sup>3</sup>.
- The Average Concentration of NO<sub>x</sub> within the Buffer Zone of Samri Lease during this period (July-August-Sept-2018) is 18 µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.



Monthwise Summary of Statistical Analysis of NOx

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

**3.7.1 Presentation of Results.**

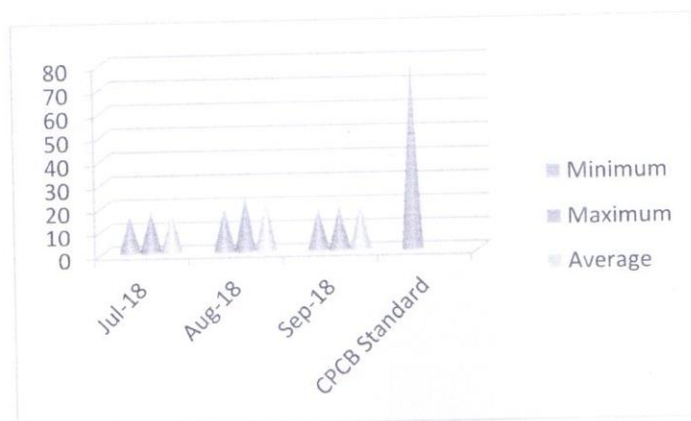
The summary of Statistical Analysis of NOx results for the month of July-August-September-2018 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Samri-Gopatu/ Nr.weigh bridge**

For the month of July-2018 the minimum and maximum concentrations for NOx were recorded as 16 $\mu\text{g}/\text{m}^3$  and 18 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 17 $\mu\text{g}/\text{m}^3$ .

For the month of August-2018 the minimum and maximum concentrations for NOx were recorded as 19 $\mu\text{g}/\text{m}^3$  and 24 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 22 $\mu\text{g}/\text{m}^3$ .

For the month of September-2018 the minimum and maximum concentrations for NOx were recorded as 18 $\mu\text{g}/\text{m}^3$  and 19 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 19 $\mu\text{g}/\text{m}^3$ .



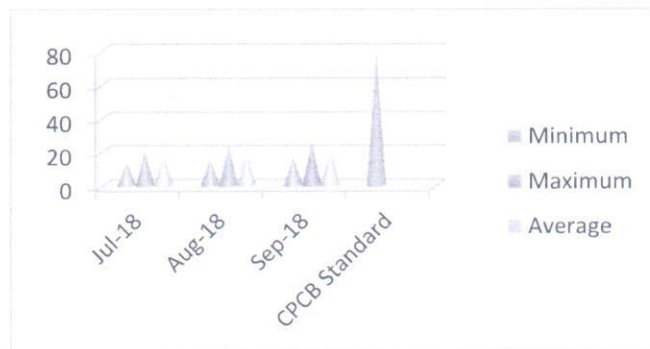


**Rajendrapur/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14µg/m<sup>3</sup> and 21µg/m<sup>3</sup> respectively and average concentration of 18µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16µg/m<sup>3</sup> and 24µg/m<sup>3</sup> respectively and average concentration of 20µg/m<sup>3</sup>.

For the month of September-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 22µg/m<sup>3</sup>.





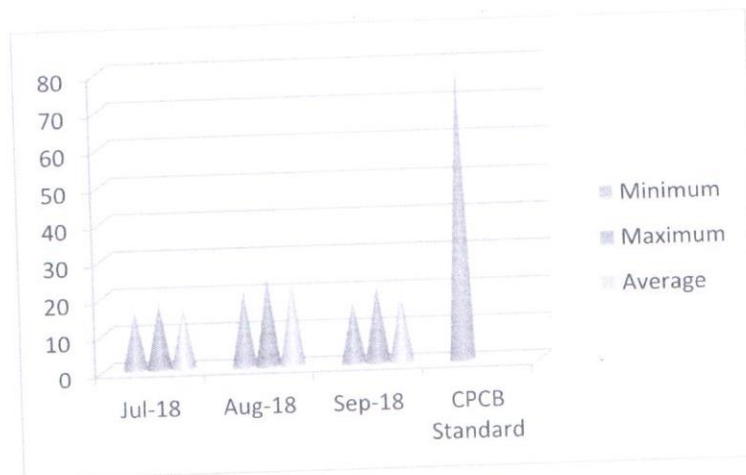


**Kutku Village/Nr.V.T. Center**

For the month of July-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16µg/m<sup>3</sup> and 18µg/m<sup>3</sup> respectively and average concentration of 17µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21µg/m<sup>3</sup> and 24µg/m<sup>3</sup> respectively and average concentration of 23µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17µg/m<sup>3</sup> and 21µg/m<sup>3</sup> respectively and average concentration of 19µg/m<sup>3</sup>.



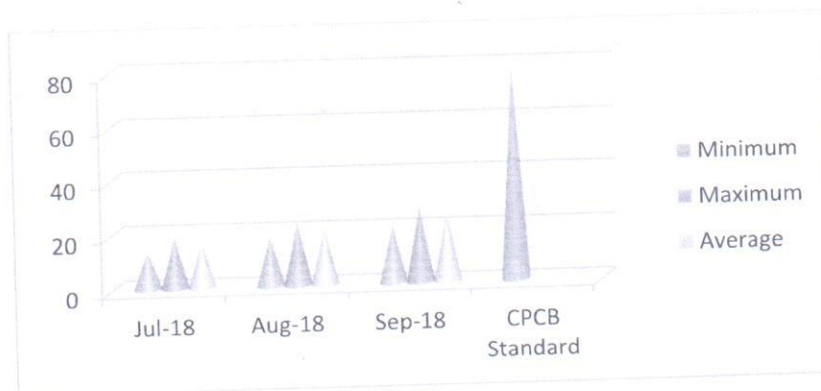


**Dumerkholi/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14µg/m<sup>3</sup> and 19µg/m<sup>3</sup> respectively and average concentration of 17µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18µg/m<sup>3</sup> and 23µg/m<sup>3</sup> respectively and average concentration of 21µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21µg/m<sup>3</sup> and 28µg/m<sup>3</sup> respectively and average concentration of 25µg/m<sup>3</sup>.





### 3.8 Fugitive Emission (Buffer Zone):-

#### 3.8.1 Presentation of Results.

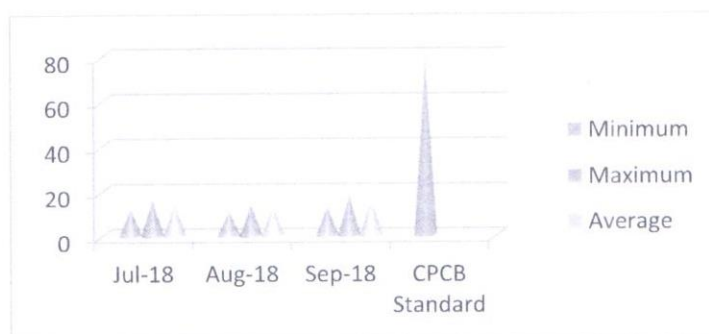
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of July-August-September-2018 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring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

#### Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 12µg/m<sup>3</sup> and 16µg/m<sup>3</sup> respectively and average concentration of 14µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 11µg/m<sup>3</sup> and 14µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 13µg/m<sup>3</sup> and 18µg/m<sup>3</sup> respectively and average concentration of 16µg/m<sup>3</sup>.



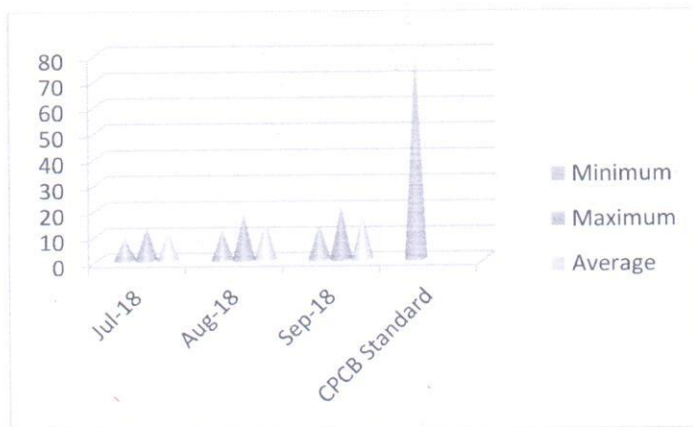


**Jaljali Village**

For the month of July-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 9µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 12µg/m<sup>3</sup> and 18µg/m<sup>3</sup> respectively and average concentration of 15µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14µg/m<sup>3</sup> and 21µg/m<sup>3</sup> respectively and average concentration of 18µg/m<sup>3</sup>.



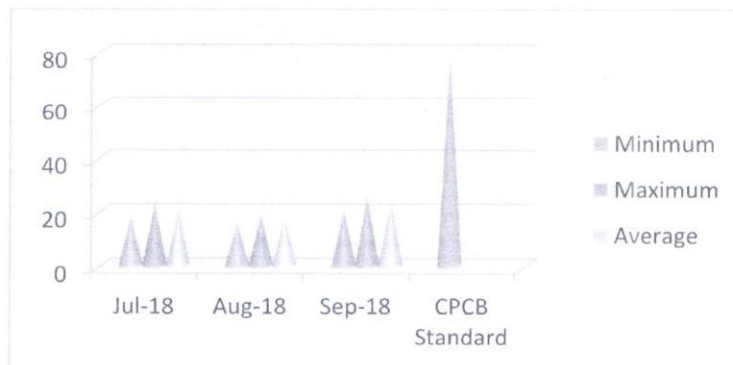


**Tatijharia Village/Nr.Weigh Bridge**

For the month of July-2018 the minimum and maximum concentrations, for NOx were recorded as 18µg/m<sup>3</sup> and 23µg/m<sup>3</sup> respectively and average concentration of 21µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for NOx were recorded as 16µg/m<sup>3</sup> and 19µg/m<sup>3</sup> respectively and average concentration of 18µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for NOx were recorded as 21µg/m<sup>3</sup> and 26µg/m<sup>3</sup> respectively and average concentration of 24µg/m<sup>3</sup>.

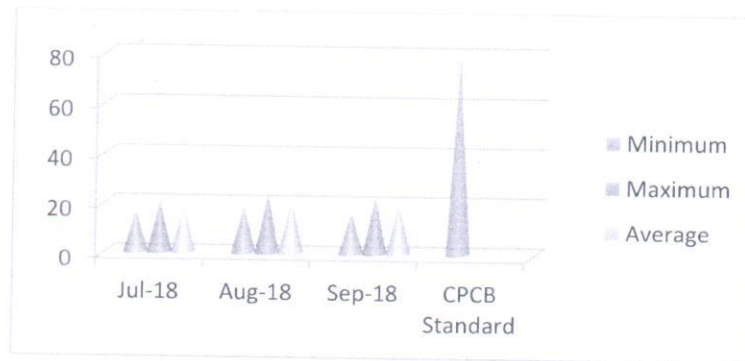


**Piprapat/Nr.Mining Area**

For the month of July-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17µg/m<sup>3</sup> and 21µg/m<sup>3</sup> respectively and average concentration of 19µg/m<sup>3</sup>.

For the month of August-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 19µg/m<sup>3</sup> and 24µg/m<sup>3</sup> respectively and average concentration of 22µg/m<sup>3</sup>.

For the month of September-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17µg/m<sup>3</sup> and 23µg/m<sup>3</sup> respectively and average concentration of 20µg/m<sup>3</sup>.



|   |   |                     |
|---|---|---------------------|
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|---|---|---------------------|

**Table 11**  
**Statistical Analysis of Pb**

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

| Location                               | Month & Year        | Min.  | Max.  | A.M.  | G.M.  | 98%   |
|--|---------------------|-------|-------|-------|-------|-------|
| <b>Fugitive Emission (Core Zone):-</b> |                     |       |       |       |       |       |
| Samri-Gopatu/<br>Nr.weigh bridge       | July-2018           | 0.027 | 0.042 | 0.035 | 0.035 | 0.042 |
|  | August-2018         | 0.049 | 0.068 | 0.059 | 0.059 | 0.068 |
|  | September-2018      | 0.031 | 0.052 | 0.042 | 0.042 | 0.052 |
| Rajendrapur/<br>Nr.Mining Area         | July-2018           | 0.024 | 0.047 | 0.036 | 0.036 | 0.047 |
|  | August-2018         | 0.052 | 0.064 | 0.058 | 0.058 | 0.064 |
|  | September-2018      | 0.048 | 0.059 | 0.054 | 0.054 | 0.059 |
| Kutku Village/<br>Nr.V.T. Center       | July-2018           | 0.037 | 0.048 | 0.043 | 0.043 | 0.048 |
|  | August-2018         | 0.056 | 0.067 | 0.062 | 0.062 | 0.067 |
|  | September-2018      | 0.061 | 0.073 | 0.067 | 0.067 | 0.073 |
| Dumerkholi/<br>Nr.Mining Area          | July-2018           | 0.026 | 0.047 | 0.037 | 0.037 | 0.047 |
|  | August-2018         | 0.038 | 0.062 | 0.050 | 0.050 | 0.062 |
|  | September-2018      | 0.029 | 0.058 | 0.044 | 0.044 | 0.057 |
| <b>CPCB Standard</b>                   | <b>1.0 (24 hrs)</b> |       |       |       |       |       |

| Location                                | Month & Year        | Min. | Max. | A.M. | G.M. | 98% |
|---|---------------------|------|------|------|------|-----|
| <b>Buffer Zone :-</b>                   |                     |      |      |      |      |     |
| Sairaidh Campus                         | July-2018           | ND   | ND   | ND   | ND   | ND  |
|   | August-2018         | ND   | ND   | ND   | ND   | ND  |
|   | September-2018      | ND   | ND   | ND   | ND   | ND  |
| Jaljali Village                         | July-2018           | ND   | ND   | ND   | ND   | ND  |
|   | August-2018         | ND   | ND   | ND   | ND   | ND  |
|   | September-2018      | ND   | ND   | ND   | ND   | ND  |
| Tatijharia Village/<br>Nr. Weigh bridge | July-2018           | ND   | ND   | ND   | ND   | ND  |
|   | August-2018         | ND   | ND   | ND   | ND   | ND  |
|   | September-2018      | ND   | ND   | ND   | ND   | ND  |
| Piprapat/<br>Nr.Mining Area             | July-2018           | ND   | ND   | ND   | ND   | ND  |
|   | August-2018         | ND   | ND   | ND   | ND   | ND  |
|   | September-2018      | ND   | ND   | ND   | ND   | ND  |
| <b>CPCB Standard</b>                    | <b>1.0 (24 hrs)</b> |      |      |      |      |     |

**Conclusion: A)**

The Average Concentration of Pb within the Core Zone of Samri Lease during this period (July To September-2018) is  $0.067 \mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion: B)**

The Average Concentration of Pb within the Buffer Zone of Samri Lease during this period (July To September-2018) is Not detected.



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**Table 12**

**Statistical Analysis of Hg**

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

| Location                                 | Month & Year   | Min. | Max. | A.M. | G.M. | 98%le |
|--|----------------|------|------|------|------|-------|
| <b>Fugitive Emission (Core Zone):-</b>   |                |      |      |      |      |       |
| <b>Samri-Gopatu/<br/>Nr.weigh bridge</b> | July-2018      | ND   | ND   | ND   | ND   | ND    |
|  | August-2018    | ND   | ND   | ND   | ND   | ND    |
|  | September-2018 | ND   | ND   | ND   | ND   | ND    |
| <b>Rajendrapur/<br/>Nr.Mining Area</b>   | July-2018      | ND   | ND   | ND   | ND   | ND    |
|  | August-2018    | ND   | ND   | ND   | ND   | ND    |
|  | September-2018 | ND   | ND   | ND   | ND   | ND    |
| <b>Kutku Village/<br/>Nr.V.T. Center</b> | July-2018      | ND   | ND   | ND   | ND   | ND    |
|  | August-2018    | ND   | ND   | ND   | ND   | ND    |
|  | September-2018 | ND   | ND   | ND   | ND   | ND    |
| <b>Dumerkholi/<br/>Nr.Mining Area</b>    | July-2018      | ND   | ND   | ND   | ND   | ND    |
|  | August-2018    | ND   | ND   | ND   | ND   | ND    |
|  | September-2018 | ND   | ND   | ND   | ND   | ND    |

**Buffer Zone :-**

|   |                |      |    |    |    |    |
|---|----------------|------|----|----|----|----|
| <b>Sairaidh Campus</b>                          | July-2018      | ND   | ND | ND | ND | ND |
|   | August-2018    | ND   | ND | ND | ND | ND |
|   | September-2018 | ND   | ND | ND | ND | ND |
| <b>Jaljali Village</b>                          | July-2018      | ND   | ND | ND | ND | ND |
|   | August-2018    | ND   | ND | ND | ND | ND |
|   | September-2018 | ND   | ND | ND | ND | ND |
| <b>Tatijharia Village/<br/>Nr. Weigh bridge</b> | July-2018      | ND   | ND | ND | ND | ND |
|   | August-2018    | ND   | ND | ND | ND | ND |
|   | September-2018 | ND   | ND | ND | ND | ND |
| <b>Piprapat/<br/>Nr.Mining Area</b>             | July-2018      | ND   | ND | ND | ND | ND |
|   | August-2018    | ND   | ND | ND | ND | ND |
|   | September-2018 | ND   | ND | ND | ND | ND |
| <b>CPCB Standard</b>                            |                | ---- |    |    |    |    |

- ND-Not Detected.

**Conclusion: A)**

The Average Concentration of Hg within the Core Zone of Samri Lease during this period (July To September-2018) is Not Detected.

**Conclusion: B)**

The Average Concentration of Hg within the Buffer Zone of Samri Lease during this period (July To September-2018) is Not Detected.





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**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>   |                |                              |      |      |      |     |
| <b>Samri-Gopatu/<br/>Nr.weigh bridge</b> | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|  | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|  | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>Rajendrapur/<br/>Nr.Mining Area</b>   | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|  | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|  | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>Kutku Village/<br/>Nr.V.T. Center</b> | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|  | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|  | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>Dumerkholi/<br/>Nr.Mining Area</b>    | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|  | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|  | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>CPCB Standard</b>                     |                | <b>06</b><br><b>(Annual)</b> |      |      |      |     |

| Location  | Month & Year   | Min.                         | Max. | A.M. | G.M. | 98% |
|---|----------------|------------------------------|------|------|------|-----|
| <b>Buffer Zone :-</b>                           |                |                              |      |      |      |     |
| <b>Sairaidh Campus</b>                          | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|   | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|   | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>Jaljali Village</b>                          | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|   | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|   | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>Tatijharia Village/<br/>Nr. Weigh bridge</b> | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|   | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|   | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>Piprapat/<br/>Nr.Mining Area</b>             | July-2018      | ND                           | ND   | ND   | ND   | ND  |
|   | August-2018    | ND                           | ND   | ND   | ND   | ND  |
|   | September-2018 | ND                           | ND   | ND   | ND   | ND  |
| <b>CPCB Standard</b>                            |                | <b>06</b><br><b>(Annual)</b> |      |      |      |     |

• ND-Not Detected.

**Conclusion: A)**

The Average Concentration of As within the Core Zone of Samri Lease during this period (July To September-2018) is Not Detected.

**Conclusion: B)**

The Average Concentration of As within the Buffer Zone of Samri Lease during this period (July To September-2018) is Not Detected.



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**Free Silica :-**

| Sr. No. | Location                         | Measurement Unit | July-2018 |      | August-2018 |      | September-2018 |      |
|---------|----------------------------------|------------------|-----------|------|-------------|------|----------------|------|
|         |                                  |                  | SPM       | RSPM | SPM         | RSPM | SPM            | RSPM |
| 1.      | Rajendrapur/<br>Near Mining Area | g/100gm          | 0.31      | 0.19 | 0.42        | 0.21 | 0.34           | 0.18 |

**Table 14**

**Dust fall Rate**

| Sr. No. | Location                     | July-2018                        | August-2018 | September-2018 | Average |
|---------|------------------------------|----------------------------------|-------------|----------------|---------|
|         |                              | Rate (MT/km <sup>2</sup> /Month) |             |                |         |
| 1.      | Rajendrapur/Nr.Mining Area   | 16.59                            | 23.82       | 27.19          | 22.53   |
| 2.      | Samri-Gopatu/Nr.Weigh Bridge | 18.64                            | 21.47       | 24.63          | 21.58   |



**Table-15**

**Noise Level Monitoring**

**Unit: dB(A)**

| Sl. No.            | Location                           | July-2018 |       | August-2018 |       | September-2018 |       |
|--------------------|------------------------------------|-----------|-------|-------------|-------|----------------|-------|
|                    |                                    | Day       | Night | Day         | Night | Day            | Night |
| <b>Core Zone</b>   |                                    |           |       |             |       |                |       |
| 1.                 | Samri-Gopatu/Nr.Weigh Bridge       | 57        | 43    | 64          | 58    | 61             | 46    |
| 2.                 | Rajendrapur/Nr.Mining Area         | 61        | 52    | 67          | 59    | 71             | 53    |
| 3.                 | Kutku Village/Nr.V.T.Center        | 56.       | 41    | 58          | 42    | 61             | 47    |
| 4.                 | Dumerkholi/Nr.Mining Area          | 62        | 54    | 69          | 57    | 58             | 36    |
| <b>Buffer Zone</b> |                                    |           |       |             |       |                |       |
| 1.                 | Sairaidh Campus                    | 47        | 38    | 51          | 42    | 53             | 41    |
| 2.                 | Jaljali Village                    | 51        | 39    | 48          | 36    | 52             | 43    |
| 3.                 | Tatijharia Village/Nr.Weigh Bridge | 54        | 43    | 52          | 41    | 49             | 37    |
| 4.                 | Piprapat/Near Mining Area          | 48        | 36    | 52          | 43    | 51             | 39    |

**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                    | July-2018 |      |             | August-2018 |      |             | September-2018 |      |             |
|---------|-----------------------------|-----------|------|-------------|-------------|------|-------------|----------------|------|-------------|
|         |                             | Min.      | Max. | Avg.        | Min.        | Max. | Avg.        | Min.           | Max. | Avg.        |
| 1.      | Rajendrapur/Nr .Mining Area | 57.33     | 64.2 | <b>60.8</b> | 61.9        | 74.2 | <b>68.1</b> | 64.2           | 81.4 | <b>72.8</b> |

**Note:- All the Values are in CPCB Limit.**



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**3.9 Ground Water Quality:-** Most of the villages in the nearby plant area have hand pumps and wells as most of the residents of these villages make use of this water for drinking and other domestic uses for

**Table 16**  
**Report on Chemical Examination of Ground Water**  
**(Average of Three Months July-August-September-2018)**

|                  |  |
|------------------|--|
| <b>Location:</b> | <b>GW1) Rajendrapur / Near Mining Area</b> |
|------------------|--|

**TEST RESULTS**

| Sr. No. | Test Parameter                           | Measurement Unit | Test Method       | As per IS 10500 : 2012<br>(Drinking Water - Specification) |                    | Test Result  |
|---------|--|------------------|-------------------|--|--------------------|--------------|
|         |  |                  |                   | Acceptable Limit   | *Permissible Limit |              |
| 1.      | pH value                                 | -                | IS 3025 (Part 11) | 6.5 to 8.5   | No relaxation      | 6.87 at 25°C |
| 2.      | Turbidity                                | NTU              | IS 3025 (Part 10) | 1  | 5                  | 0.6          |
| 3.      | Colour                                   | Hazen units      | IS 3025 (Part 4)  | 5  | 15                 | 1            |
| 4.      | Odour                                    | -                | IS 3025 (Part 5)  | Agreeable  | Agreeable          | Agreeable    |
| 5.      | Taste                                    | -                | IS 3025 (Part 8)  | Agreeable  | Agreeable          | ---          |
| 6.      | Iron (as Fe)                             | mg/l             | IS 3025 (Part 2)  | 1.0  | No relaxation      | 0.19         |
| 7.      | Free residual chlorine                   | mg/l             | IS 3025 (Part 26) | Min. 0.2   | Min. 1             | < 0.1        |
| 8.      | Total dissolved solids                   | mg/l             | IS 3025 (Part 16) | 500  | 2000               | 403          |
| 9.      | Fluoride (as F)                          | mg/l             | IS 3025 (Part 60) | 1.0  | 1.5                | 0.31         |
| 10.     | Cyanide (as CN)                          | mg/l             | IS 3025 (Part 27) | 0.05   | No relaxation      | < 0.005      |
| 11.     | Chloride (as Cl)                         | mg/l             | IS 3025 (Part 32) | 250  | 1000               | 103.59       |
| 12.     | Total Alkalinity (as CaCO <sub>3</sub> ) | mg/l             | IS 3025 (Part 23) | 200  | 600                | 141.68       |
| 13.     | Total hardness (as CaCO <sub>3</sub> )   | mg/l             | IS 3025 (Part 21) | 200  | 600                | 180.62       |
| 14.     | Calcium (as Ca)                          | mg/l             | IS 3025 (Part 40) | 75   | 200                | 51.42        |
| 15.     | Magnesium (as Mg)                        | mg/l             | IS 3025 (Part 46) | 30   | 100                | 12.68        |
| 16.     | Sulphate (as SO <sub>4</sub> )           | mg/l             | IS 3025 (Part 24) | 200  | 400                | 32.19        |
| 17.     | Nitrate (as NO <sub>3</sub> )            | mg/l             | APHA Method       | 45   | No relaxation      | 9.27         |
| 18.     | Copper (as Cu)                           | mg/l             | IS 3025 (Part 2)  | 0.05   | 1.5                | < 0.03       |
| 19.     | Manganese (as Mn)                        | mg/l             | IS 3025 (Part 2)  | 0.1  | 0.3                | <0.05        |
| 20.     | Mercury (as Hg)                          | mg/l             | IS 3025 (Part 2)  | 0.001  | No relaxation      | < 0.0005     |
| 21.     | Cadmium (as Cd)                          | mg/l             | IS 3025 (Part 2)  | 0.003  | No relaxation      | < 0.001      |
| 22.     | Selenium (as Se)                         | mg/l             | IS 3025 (Part 2)  | 0.01   | No relaxation      | < 0.001      |
| 23.     | Arsenic (as As)                          | mg/l             | IS 3025 (Part 2)  | 0.01   | No relaxation      | < 0.01       |
| 24.     | Aluminium (as Al)                        | mg/l             | IS 3025 (Part 2)  | 0.03   | 0.2                | < 0.005      |
| 25.     | Lead (as Pb)                             | mg/l             | IS 3025 (Part 2)  | 0.01   | No relaxation      | < 0.001      |
| 26.     | Zinc (as Zn)                             | mg/l             | IS 3025 (Part 2)  | 5  | 15                 | 1.2          |

< indicates detection limit of the laboratory.

**Contd....**



**Hindalco Industries Limited  
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Report for July-2018 To September-2018**

**Introduction**

**(Contd.....)**

| Sr. No | Test Parameter   | Measurement Unit | Test Method                 | As per IS 10500 : 2012<br>(Drinking Water - Specification) |                    | Test Result |
|--------|--|------------------|-----------------------------|--|--------------------|-------------|
|        |  |                  |                             | Acceptable Limit   | *Permissible Limit |             |
| 27.    | Nickel (as Ni)   | mg/l             | IS 3025 (Part 2)            | 0.02   | No relaxation      | < 0.01      |
| 28.    | Total Chromium (as Cr)                                   | mg/l             | IS 3025 (Part 2)            | 0.05   | No relaxation      | < 0.03*     |
| 29.    | Barium (as Ba)   | mg/l             | Annexure F of IS 13428      | 0.7  | No relaxation      | < 0.01      |
| 30.    | Ammonia (as N)   | mg/l             | IS 3025 (Part 34)           | 0.5  | No relaxation      | < 0.1       |
| 31.    | Sulphide (as H <sub>2</sub> S)                           | mg/l             | IS 3025 (Part 29)           | 0.05   | No relaxation      | < 0.03      |
| 32.    | Chloramines (as Cl <sub>2</sub> )                        | mg/l             | APHA 4500-Cl <sub>2</sub> G | 4.0  | No relaxation      | < 0.01      |
| 33.    | Molybdenum (as Mo)                                       | mg/l             | IS 3025 (Part 2)            | 0.07   | No relaxation      | < 0.001     |
| 34.    | Silver (as Ag)   | mg/l             | Annexure J of IS 13428      | 0.1  | No relaxation      | < 0.001     |
| 35.    | Polychlorinated Biphenyls (PCB)                          | µg/l             | USEPA 508                   | 0.5  | No relaxation      | < 0.03      |
| 36.    | Boron (as B)   | mg/l             | IS 3025 (Part 2)            | 0.5  | 1.0                | < 0.1       |
| 37.    | Mineral Oil  | mg/l             | IS 3025 (Part 39)           | 0.5  | No relaxation      | < 0.001     |
| 38.    | Tri Halo Methane   |                  |                             |  |                    |             |
|        | a. Bromoform   | mg/l             | APHA 6232                   | 0.1  | No relaxation      | Absent      |
|        | b. Dibromochloromethane                                  |                  |                             | 0.1  | No relaxation      | Absent      |
|        | c. Bromodichloromethane                                  |                  |                             | 0.06   | No relaxation      | Absent      |
|        | d. Chloroform  |                  |                             | 0.2  | No relaxation      | Absent      |
| 39.    | Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH) | mg/l             | IS 3025 (Part 43) :1001     | 0.001  | 0.002              | < 0.001     |
| 40.    | Anionic detergents (as MBAS)                             | mg/l             | IS 13428:2005 (Annex K)     | 0.2  | 1.0                | < 0.01      |
| 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      |

\* indicates detection limit of the laboratory.

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**Introduction**

**(Contd.....)**

| Sr. No.    | Test Parameter                 | Measurement Unit | Test Method | As per IS 10500 : 2012 (Drinking Water - Specification) | Test Re |
|------------|--------------------------------|------------------|-------------|---|---------|
| <b>44.</b> | <b>Pesticides residues</b>     |                  |             |   |         |
| i.         | Alpha-HCH                      | µg/l             | USEPA 508   | 0.01  | Abse    |
| ii.        | Beta HCH                       | µg/l             | USEPA 508   | 0.04  | Abse    |
| iii.       | Delta- HCH                     | µg/l             | USEPA 508   | 0.04  | Abse    |
| iv.        | Alachlor                       | µg/l             | USEPA 508   | 20  | Abse    |
| v.         | Aldrin / Dieldrin              | µg/l             | USEPA 508   | 0.03  | Abse    |
| vi.        | Atrazine                       | µg/l             | USEPA 1657  | 2   | Abse    |
| vii.       | Butachlor                      | µg/l             | USEPA 508   | 125   | Abse    |
| viii.      | Chlorpyrifos                   | µg/l             | USEPA 1657  | 30  | Abse    |
| ix.        | DDT and its Isomers            | µg/l             | USEPA 508   | 1   | Abse    |
| x.         | Gamma - HCH (Lindane)          | µg/l             | USEPA 508   | 2   | Abse    |
| xi.        | 2,4-Dichlorophenoxyacetic acid | µg/l             | USEPA 1657  | 30  | Abse    |
| xii.       | Endosulphan                    | µg/l             | USEPA 508   | 0.4   | Abse    |
| xiii.      | Ethion                         | µg/l             | USEPA 1657  | 3   | Abse    |
| xiv.       | Isoproturon                    | µg/l             | USEPA 1657  | 9   | Abse    |
| xv.        | Malathion                      | µg/l             | USEPA 1657  | 190   | Abse    |
| xvi.       | Methyl Parathion               | µg/l             | USEPA 1657  | 0.3   | Abse    |
| xvii.      | Monocrotophos                  | µg/l             | USEPA 1657  | 1   | Abse    |
| xviii.     | Phorate                        | µg/l             | USEPA 1657  | 2   | Abse    |

**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. 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 conformed to IS:10500:2012, for tests conducted, indicating that it is fit for drinking purpose with respect to above mentioned parameters.



**Hindalco Industries Limited**  
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**Introduction**

**Table 17**

**Monthly Report on Chemical Examination of Surface Water**

**(Nallahs Near by Rajendrapur/Near Mining Area)**

**(Average of Three Months July-August-September-2018)**

| Sr. No. | Test Parameter                           | Measurement Unit | Test Method       | As per IS 10500 : 2012<br>(Drinking Water - Specification) |                    | Test Result  |
|---------|--|------------------|-------------------|--|--------------------|--------------|
|         |  |                  |                   | Acceptable Limit   | *Permissible Limit |              |
| 1       | pH value                                 | -                | IS 3025 (Part 11) | 6.5 to 8.5   | No relaxation      | 6.73 at 25°C |
| 2       | Turbidity                                | NTU              | IS 3025 (Part 10) | 1  | 5                  | 16.2         |
| 3       | Colour                                   | Hazen units      | IS 3025 (Part 4)  | 5  | 15                 | 9            |
| 4       | Odour                                    | -                | IS 3025 (Part 5)  | Agreeable  | Agreeable          | Agreeable    |
| 5       | Taste                                    | -                | IS 3025 (Part 8)  | Agreeable  | Agreeable          | ---          |
| 6       | Iron (as Fe)                             | mg/l             | IS 3025 (Part 2)  | 1.0  | No relaxation      | 0.27         |
| 7       | Free residual chlorine                   | mg/l             | IS 3025 (Part 26) | Min. 0.2   | Min. 1             | < 0.1        |
| 8       | Total dissolved solids                   | mg/l             | IS 3025 (Part 16) | 500  | 2000               | 453          |
| 9       | Fluoride (as F)                          | mg/l             | IS 3025 (Part 60) | 1.0  | 1.5                | 0.49         |
| 10      | Cyanide (as CN)                          | mg/l             | IS 3025 (Part 27) | 0.05   | No relaxation      | < 0.005      |
| 11      | Chloride (as Cl)                         | mg/l             | IS 3025 (Part 32) | 250  | 1000               | 172.82       |
| 12      | Total Alkalinity (as CaCO <sub>3</sub> ) | mg/l             | IS 3025 (Part 23) | 200  | 600                | 138.59       |
| 13      | Total hardness (as CaCO <sub>3</sub> )   | mg/l             | IS 3025 (Part 21) | 200  | 600                | 240.57       |
| 14      | Calcium (as Ca)                          | mg/l             | IS 3025 (Part 40) | 75   | 200                | 73.82        |
| 15      | Magnesium (as Mg)                        | mg/l             | IS 3025 (Part 46) | 30   | 100                | 13.64        |
| 16      | Sulphate (as SO <sub>4</sub> )           | mg/l             | IS 3025 (Part 24) | 200  | 400                | 116.29       |
| 17      | Nitrate (as NO <sub>3</sub> )            | mg/l             | APHA Method       | 45   | No relaxation      | 16.42        |
| 18      | Copper (as Cu)                           | mg/l             | IS 3025 (Part 2)  | 0.05   | 1.5                | < 0.03       |
| 19      | Manganese (as Mn)                        | mg/l             | IS 3025 (Part 2)  | 0.1  | 0.3                | <0.05        |
| 20      | Mercury (as Hg)                          | mg/l             | IS 3025 (Part 2)  | 0.001  | No relaxation      | < 0.0005     |
| 21      | Cadmium (as Cd)                          | mg/l             | IS 3025 (Part 2)  | 0.003  | No relaxation      | < 0.001      |
| 22      | Selenium (as Se)                         | mg/l             | IS 3025 (Part 2)  | 0.01   | No relaxation      | < 0.001      |
| 23      | Arsenic (as As)                          | mg/l             | IS 3025 (Part 2)  | 0.01   | No relaxation      | < 0.01       |
| 24      | Aluminium (as Al)                        | mg/l             | IS 3025 (Part 2)  | 0.03   | 0.2                | < 0.005      |
| 25      | Lead (as Pb)                             | mg/l             | IS 3025 (Part 2)  | 0.01   | No relaxation      | < 0.001      |
| 26      | Zinc (as Zn)                             | mg/l             | IS 3025 (Part 2)  | 5  | 15                 | 1.7          |

'<' indicates detection limit of the laboratory.

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| Sr. No | Test Parameter   | Measurement Unit | Test Method                 | As per IS 10500 : 2012 (Drinking Water - Specification) |                    | Test Res |
|--------|--|------------------|-----------------------------|---|--------------------|----------|
|        |  |                  |                             | Acceptable Limit  | *Permissible Limit |          |
| 27.    | Nickel (as Ni)   | mg/l             | IS 3025 (Part 2)            | 0.02  | No relaxation      | < 0.01   |
| 28.    | Total Chromium (as Cr)                                   | mg/l             | IS 3025 (Part 2)            | 0.05  | No relaxation      | < 0.03   |
| 29.    | Barium (as Ba)   | mg/l             | Annexure F of IS 13428      | 0.7   | No relaxation      | < 0.01   |
| 30.    | Ammonia (as N)   | mg/l             | IS 3025 (Part 34)           | 0.5   | No relaxation      | < 0.1    |
| 31.    | Sulphide (as H <sub>2</sub> S)                           | mg/l             | IS 3025 (Part 29)           | 0.05  | No relaxation      | < 0.03   |
| 32.    | Chloramines (as Cl <sub>2</sub> )                        | mg/l             | APHA 4500-Cl <sub>2</sub> G | 4.0   | No relaxation      | < 0.01   |
| 33.    | Molybdenum (as Mo)                                       | mg/l             | IS 3025 (Part 2)            | 0.07  | No relaxation      | < 0.001  |
| 34.    | Silver (as Ag)   | mg/l             | Annexure J of IS 13428      | 0.1   | No relaxation      | < 0.001  |
| 35.    | Polychlorinated Biphenyls (PCB)                          | µg/l             | USEPA 508                   | 0.5   | No relaxation      | < 0.03   |
| 36.    | Boron (as B)   | mg/l             | IS 3025 (Part 2)            | 0.5   | 1.0                | 0.13     |
| 37.    | Mineral Oil  | mg/l             | IS 3025 (Part 39)           | 0.5   | No relaxation      | < 0.001  |
| 38.    | Tri Halo Methane   |                  |                             |   |                    |          |
|        | a. Bromoform   | mg/l             | APHA 6232                   | 0.1   | No relaxation      | Absent   |
|        | b. Dibromochloromethane                                  |                  |                             | 0.1   | No relaxation      | Absent   |
|        | c. Bromodichloromethane                                  |                  |                             | 0.06  | No relaxation      | Absent   |
|        | d. Chloroform  |                  |                             | 0.2   | No relaxation      | Absent   |
| 39.    | Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH) | mg/l             | IS 3025 (Part 43) :1001     | 0.001   | 0.002              | < 0.001  |
| 40.    | Anionic detergents (as MBA <sub>5</sub> )                | mg/l             | IS 13428:2005 (Annex K)     | 0.2   | 1.0                | < 0.01   |
| 41.    | Polynuclear aromatic hydrocarbon (PAH)                   | µg/l             | USEPA : 550                 | 0.1   | No relaxation      | < 0.03   |
| 42.    | Total coliform   | MPN/100 ml       | IS 1622                     | ---   | ---                | 1600     |
| 43.    | <i>Escherichia coli</i>                                  | Per100 ml        | IS 1622                     | Absent  | Absent             | Present  |

'<' indicates detection limit of the laboratory.

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**Introduction**

(Contd.....)

| Sr. No.    | Test Parameter                 | Measurement Unit | Test Method | As per IS 10500 : 2012 (Drinking Water - Specification) | Test Result |
|------------|--------------------------------|------------------|-------------|---|-------------|
| <b>44.</b> | <b>Pesticides residues</b>     |                  |             |   | *           |
| i          | Alpha-HCH                      | µg/l             | USEPA 508   | 0.01  | < 0.01      |
|            | Beta HCH                       | µg/l             | USEPA 508   | 0.04  | < 0.03      |
|            | Delta- HCH                     | µg/l             | USEPA 508   | 0.04  | < 0.03      |
|            | Alachlor                       | µg/l             | USEPA 508   | 20 *  | < 0.03      |
|            | Aldrin / Dieldrin              | µg/l             | USEPA 508   | 0.03  | < 0.03      |
|            | Atrazine                       | µg/l             | USEPA 1657  | 2   | < 0.03      |
|            | Butachlor                      | µg/l             | USEPA 508   | 125   | < 0.03      |
|            | Chlorpyrifos                   | µg/l             | USEPA 1657  | 30  | < 0.03      |
|            | DDT and its Isomers            | µg/l             | USEPA 508   | 1   | < 0.03      |
|            | Gamma - HCH (Lindane)          | µg/l             | USEPA 508   | 2   | < 0.03      |
|            | 2,4-Dichlorophenoxyacetic acid | µg/l             | USEPA 1657  | 30  | < 0.03      |
|            | Endosulphan                    | µg/l             | USEPA 508   | 0.4   | < 0.03      |
|            | Ethion                         | µg/l             | USEPA 1657  | 3   | < 0.03      |
|            | Isoproturon                    | µg/l             | USEPA 1657  | 9   | < 0.03      |
|            | Malathion                      | µg/l             | USEPA 1657  | 190   | < 0.03      |
|            | Methyl Parathion               | µg/l             | USEPA 1657  | 0.3   | < 0.03      |
|            | Monocrotophos                  | µg/l             | USEPA 1657  | 1   | < 0.03      |
|            | Phorate                        | µg/l             | USEPA 1657  | 2   | < 0.03      |

**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.

**Table 18**

**Soil Analysis Report**

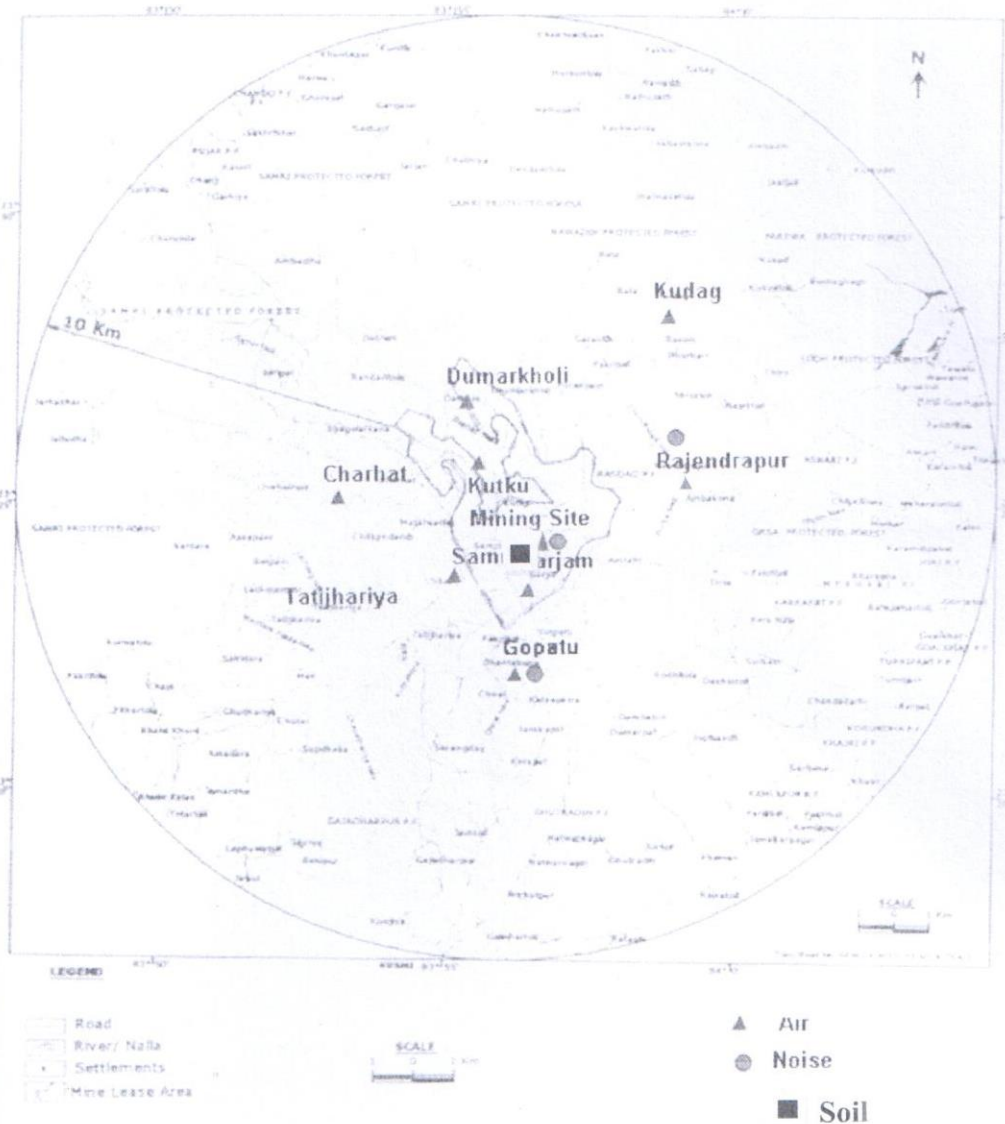
Date of collection: September-2018

| Sr. No | Test Parameters                           | Measurement Unit | Results                    |
|--------|---|------------------|----------------------------|
|        |   |                  | Rajendrapur/Nr.Mining Area |
| 1      | pH  | -                | 6.73 at 25°C               |
| 2      | Electrical Conductivity at 25°C           | µS/cm            | 152.9                      |
| 3      | Texture                                   | -                | Silty clay                 |
| 4      | Sand                                      | %                | 56.18                      |
| 5      | Silt                                      | %                | 18.64                      |
| 6      | Clay                                      | %                | 25.18                      |
| 7      | Bulk Density                              | g/cc             | 1.43                       |
| 8      | Porosity                                  | %                | 13.52                      |
| 9      | Water Holding Capacity                    | %                | 21.94                      |
| 10     | Exchangeable Calcium as Ca                | mg/kg            | 716.2                      |
| 11     | Exchangeable Magnesium as Mg              | mg/kg            | 138.9                      |
| 12     | Exchangeable Sodium as Na                 | mg/kg            | 104.7                      |
| 13     | Available Potassium as K                  | kg/ha.           | 382                        |
| 14     | Available Phosphorous as P                | kg/ha.           | 11.39                      |
| 15     | Available Nitrogen as N                   | kg/ha.           | 164.26                     |
| 16     | Organic Matter                            | %                | 1.17                       |
| 17     | Organic Carbon                            | %                | 0.63                       |
| 18     | Water Soluble Chloride as Cl <sup>+</sup> | mg/kg            | 546.28                     |
| 19     | Water Soluble Sulphate as SO <sub>4</sub> | mg/kg            | 417                        |
| 20     | Sodium Absorption Ratio                   | -                | 7.19                       |
| 21     | CEC                                       | meq/100 gm       | 12.68                      |
| 22     | Total Iron                                | %                | 7.3                        |
| 23     | Available Manganese                       | mg/kg            | 116.52                     |
| 24     | Available Zinc                            | mg/kg            | 81.69                      |
| 25     | Available Boron                           | mg/kg            | ND                         |

**Method of sampling and analysis:** IS: 2720 and methods of soil analysis, part I, 2<sup>nd</sup> Ed, 1986 of (American society for Agronomy and soil science society of America)

**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'.

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



**Fig 3: Sampling Locations for Air, Noise**

