



## **1.1 Introduction**

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

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

HINDALCO INDUSTRIES LTD., awarded the work to M/s ANACON LABORATORIES PVT. LTD. Nagpur (ALPL) for carrying out Environmental monitoring of parameters for assessing pollution levels and preparation of monthly reports (*January-February-March-2018*) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment and Forest (MoEF) for Kudag mining lease in Balrampur District, Chhattisgarh State.

## **1.2 Background Information of Kudag Mine**

Hindalco was granted Kudag Bauxite mining lease over an area of 377.116 hec. in Kudag village in Post office Dumarkholi, Tehsil Samri(Kusmi) of Balrampur district, Chhattisgarh on 24/12/1996 for a period of 20 years. The mining operations were started on 02/07/1997. The production capacity of Bauxite is 0.6 Lakh Tonnes Per Annum (LTPA).

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

The deposits occur in Kudag block, Post office Dumarkholi Tehsil 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 :( **Table1**).



**Table 1**

**Salient Features of Kudag Bauxite Mines**

<b>S.No.</b>	<b>Particulars</b>	<b>Details</b>
1.	Survey of India Toposheet No.	64 M /15
2.	Latitude	23 <sup>0</sup> 26' 02"N to 23 <sup>0</sup> 29' 00"N
3.	Longitude	83 <sup>0</sup> 51' 00"E to 83 <sup>0</sup> 59' 00"E
4.	Elevation	1145-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3 <sup>0</sup> C Annual minimum temperature : 17.7 <sup>0</sup> C Average annual rainfall : 1401.1 mm
6.	Mining lease area	377.116 Hec.
7.	Method of mining	Open cast (Semi-Mechanized)
8.	Mode of transportation	Trucks
9.	Landuse	Agricultural and Barren land
10.	Nearest Road	Samri to Kusmi (17 km)
11.	Nearest Airport	Ranchi Airport (151.09 Km)
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 ALPL has been monitoring air, water and noise quality on monthly basis during these months (**Table-2**).



## **1.5 Air Environment**

### **1.5.1 Ambient Air Quality Monitoring**

Ambient Air Quality and Fugitive emission monitored at 8 following locations with reference to Kudag mine lease area shown in **(Fig.-1)**.

**Table 2**

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

<b>Sr. No.</b>	<b>Core Zone</b>	<b>Sr.</b>	<b>Buffer Zone</b>
1	Sairaidh Campus	5	Jaljali Village
2	New Kudag/Nr.Weigh Bridge	6	Samri Chowk/Nr. Old Weigh Bridge
3	Old Kudag/Mining Area	7	Rajendrapur
4	Khas Kudag	8	Tatijharia Village

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the mining site. ALPL 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 Khaskudag during January-February-March-2018. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

### **Sampling Duration and Frequency**

Ambient air quality 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 January-February-March-2018 as per CPCB norms. Sampling conducted duration and Frequency is given in **(Table 3)**.

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

 <p><b>HINDALCO</b> ADITYA BIRLA GROUP</p>	<p><b>Hindalco Industries Limited</b> <b>Kudag Mining Environmental Status Report for</b> <b>January-2018 To March-2018</b></p>	<p><b>Details of Salient</b> <b>Features</b></p>
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## **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 fiber 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 Chowk 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-4.0**



**Table-3.0**

<b>Parameters</b>	<b>Sampling frequency</b>
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**

<b>S.No.</b>	<b>Parameter</b>	<b>Technique</b>	<b>Technical Protocol</b>	<b>Minimum Reportable Value (µg/m<sup>3</sup>)</b>
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.	Mercury (Hg)	By Cold Vapor atomic Absorption	IS-5182 (Part-I)	0.001
8.	Dust Full	Gravimetric	IS-5182 (Part-I)	—



### **1.6 Fugitive Emission Monitoring (Core Zone)**

The summary of Fugitive Emission monitoring results for the month of January-February-March-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.

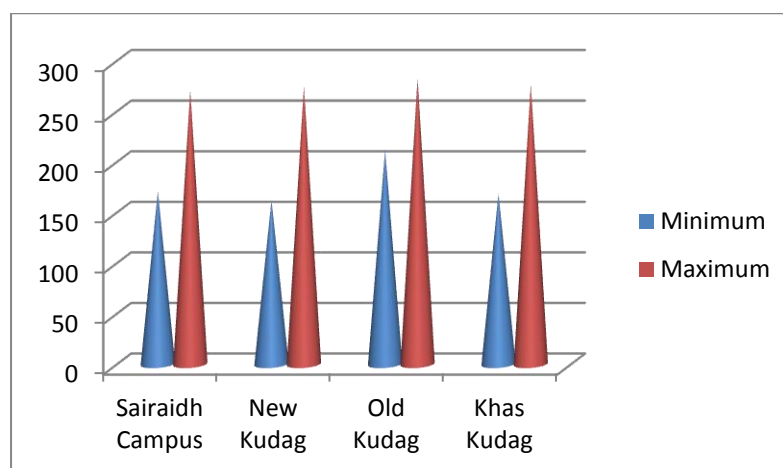
#### **1.6.1 Presentation of Results.**

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

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 169 $\mu\text{g}/\text{m}^3$  and 290 $\mu\text{g}/\text{m}^3$  respectively. The average concentrations were ranged between 206 to 270 $\mu\text{g}/\text{m}^3$ , and 98<sup>th</sup> percentile values ranged between 230 to 289 $\mu\text{g}/\text{m}^3$  in the study area (**Table 6**).

#### **Graphical Presentation of Fugitive Emission Monitoring**

### **SPM**

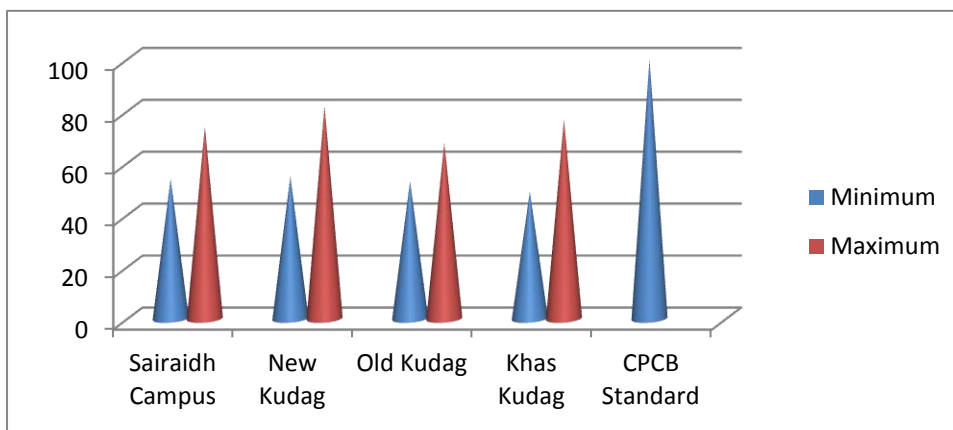


**Respirable Suspended Particulate Matter –RSPM**

The minimum and maximum concentrations for RSPM were recorded as 52µg/m<sup>3</sup> and 74µg/m<sup>3</sup> respectively. The average values were observed to be in the range of 61to 69µg/m<sup>3</sup> and 98<sup>th</sup> percentile values ranged between 63 to 74µg/m<sup>3</sup> in the study area **(Table 7)**.

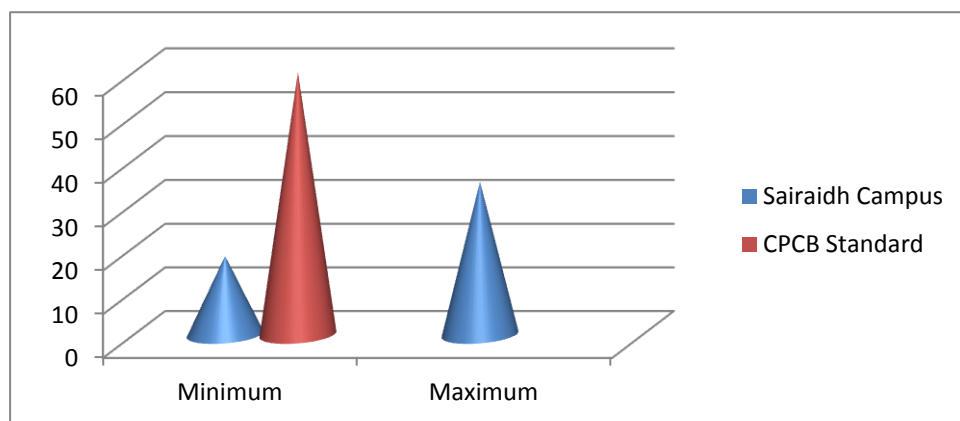
**Graphical Presentation of Fugitive Emission Monitoring**

**RSPM**



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

The minimum and maximum values of PM<sub>2.5</sub> concentrations varied between 19 to 31µg/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 31µg/m<sup>3</sup> **(Table 8)**.

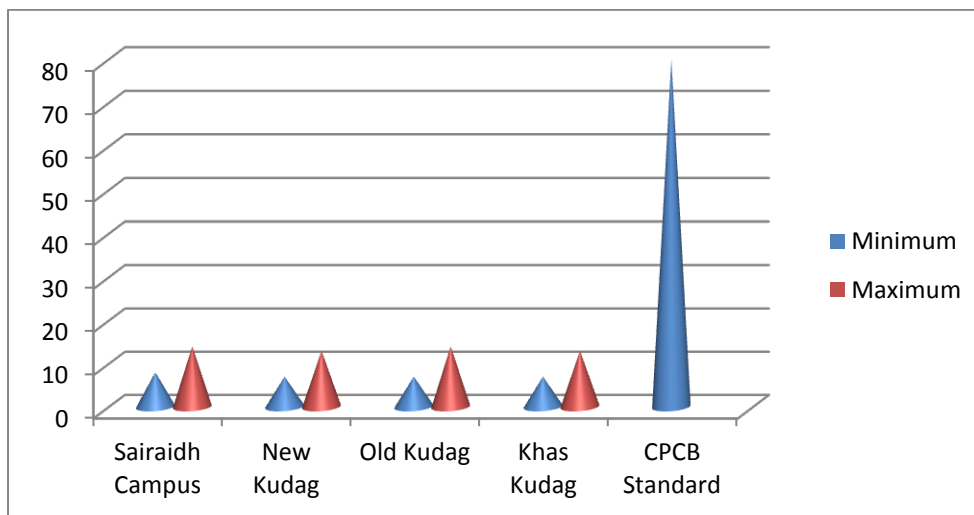


**Sulphur Dioxide (SO<sub>2</sub>)**

The minimum and maximum SO<sub>2</sub> concentrations were recorded as 9µg/m<sup>3</sup> and 16µg/m<sup>3</sup> respectively. The average values were observed to be in the range of 10 to 14µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 13 to 16µg/m<sup>3</sup> (**Table 9**).

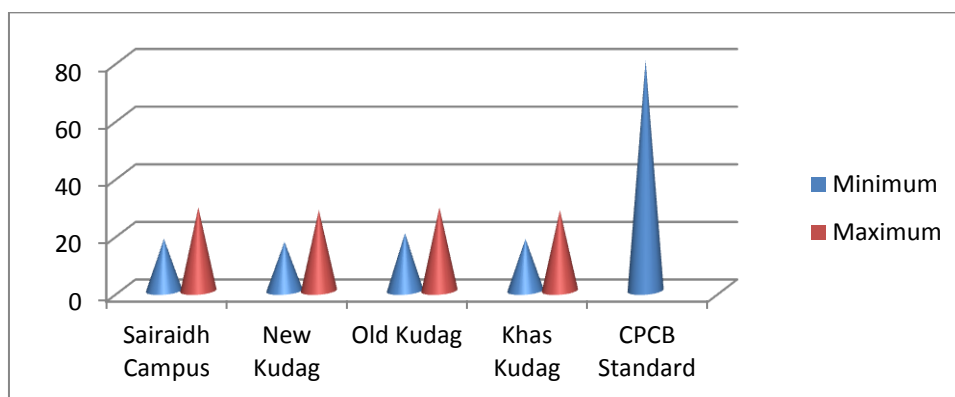
**Graphical Presentation Of Fugitive Emission Monitoring**

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



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

The minimum and maximum NO<sub>x</sub> concentrations were recorded as 19µg/m<sup>3</sup> and 33µg/m<sup>3</sup>. The average concentrations were ranged between 24 to 28µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 27 to 33µg/m<sup>3</sup> (**Table 10**).







### **Lead (Pb)**

The minimum and maximum Lead detected between 0.024 to 0.057 $\mu\text{g}/\text{m}^3$  respectively. The average Lead detected between 0.031 to 0.050 $\mu\text{g}/\text{m}^3$  & 98th percentile values varied between 0.038 to 0.057 $\mu\text{g}/\text{m}^3$  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, RSPM ( $\text{PM}_{10}$ ),  $\text{PM}_{2.5}$ ,  $\text{SO}_2$ ,  $\text{NO}_x$ , Pb, Hg, As, Cr and Dust fall are required to compute Buffer Zone. 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)**.

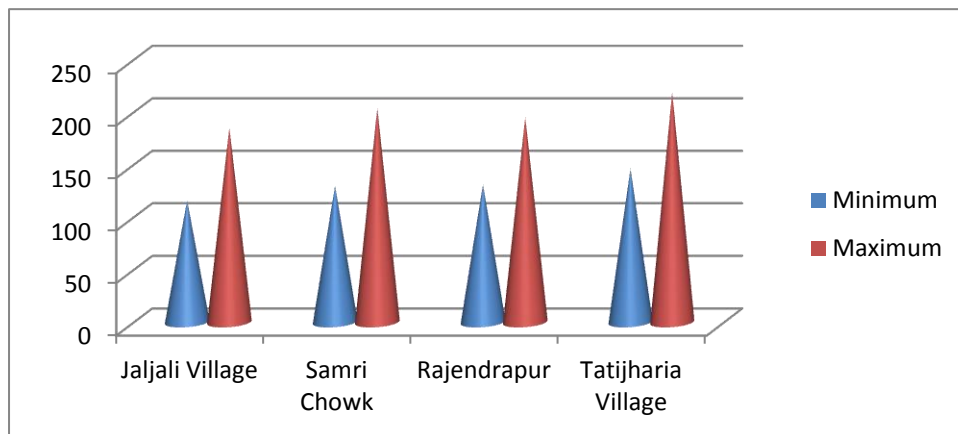
### **1.7.1 Presentation of Results.**

The summary of Ambient Air Quality monitoring results for the month of January-February-March-2018 are presented in detail in **Table 6**. 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 Buffer Zone area. The minimum and maximum values varied between 120 to 225 $\mu\text{g}/\text{m}^3$  respectively during study period at all the 4 locations. The average values ranged between 144 to 194 $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 167 to 224 $\mu\text{g}/\text{m}^3$  in the study area.

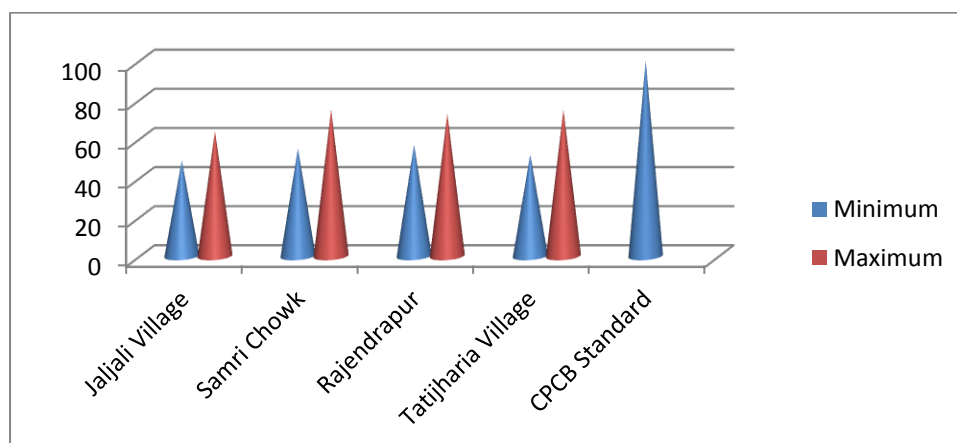
#### Graphical Presentation of Ambient Air Quality (Buffer Zone)



### Particulate Matter-RSPM

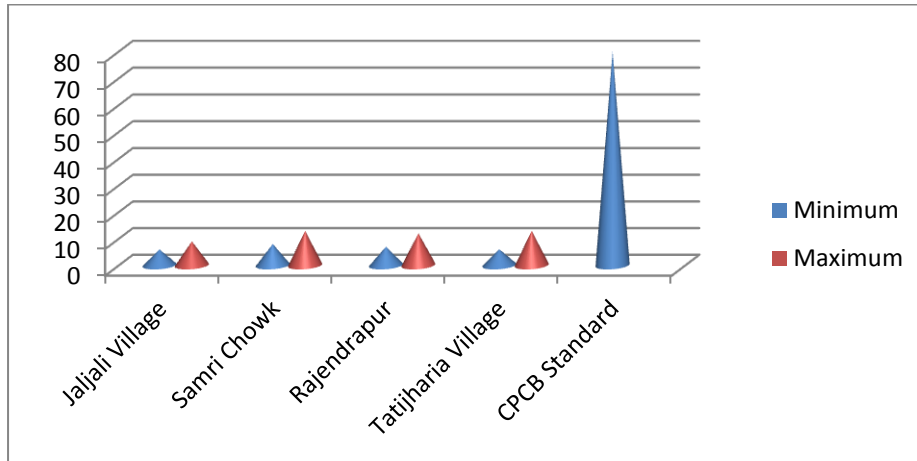
The minimum and maximum values of RSPM varied between 48 to 68 $\mu\text{g}/\text{m}^3$  respectively (**Table 7**). The average values varied between 52 to 65 $\mu\text{g}/\text{m}^3$ . The 98<sup>th</sup> percentile values varied between 54 to 68 $\mu\text{g}/\text{m}^3$  in the mining area. The overall 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.

#### Graphical Presentation Of Ambient Air Quality (Buffer Zone) RSPM



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

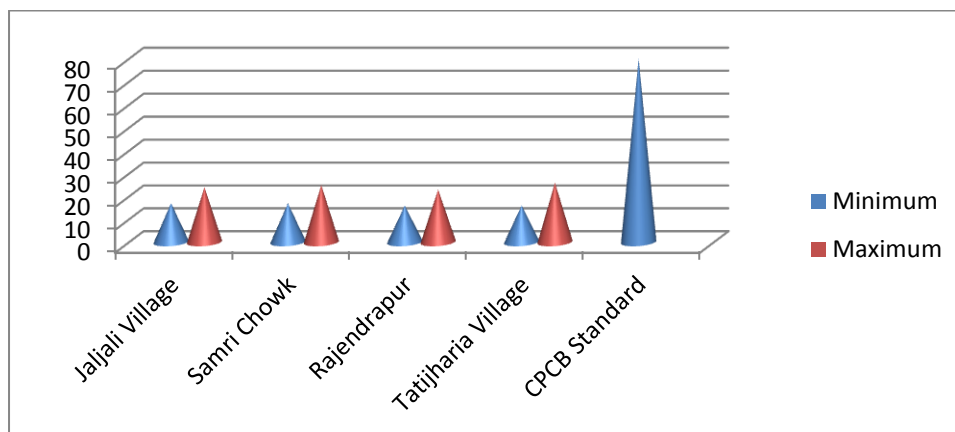
The minimum and maximum values of SO<sub>2</sub> concentrations varied between 7 to 14µg/m<sup>3</sup> respectively. The average values range between 8 to 12 µg/m<sup>3</sup> and 98th percentile values varied between 9to 14µg/m<sup>3</sup> **(Table 9)**.



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

The minimum and maximum values of NO<sub>x</sub> concentrations varied between 14 to 24µg/m<sup>3</sup> respectively. The average values range between 16 to 21µg/m<sup>3</sup> and 98th percentile values varied between 17 to 26µg/m<sup>3</sup> **(Table 10)**.

**Graphical Presentation Of Ambient Air Quality (Buffer Zone) NO<sub>x</sub>**





**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 January-February-March-2018 in Old Kudag/Mining Area and Khas Kudag village. The dust fall rate was observed to be 22.1 and 21.6MT/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, As, Cr and Hg 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 (Jan-Feb-March-2018) indicates that the wind was blowing predominantly from (ENE and NNE) directions, during study period, for 2.08% wind was found to be calm. The details of wind pattern in the form of wind frequency distribution are presented in table-1. The graphical illustration and wind rose diagram is presented in Figures-1 & 2 respectively.

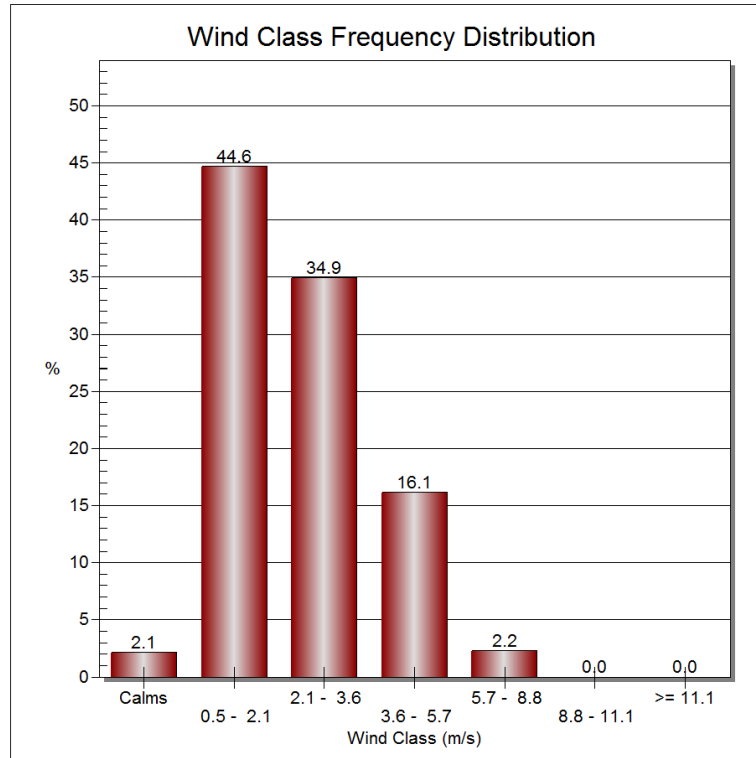
**Table.1**

#### Wind Frequency Distribution Data

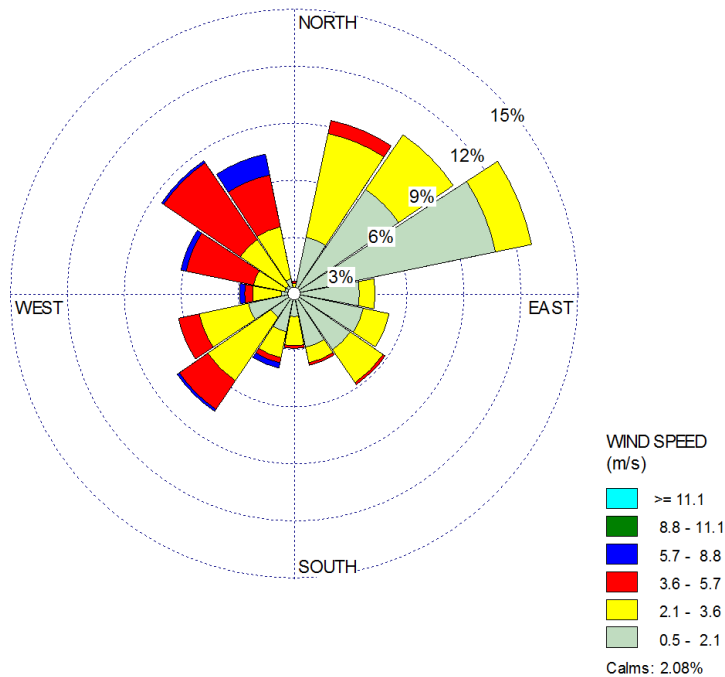
Sr.No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
1	348.75 - 11.25	0.002782	0.002782	0.001391	0.000000	0.000000	0.000000	0.006954
2	11.25 - 33.75	0.030598	0.055633	0.006954	0.000000	0.000000	0.000000	0.093185
3	33.75 - 56.25	0.066759	0.034771	0.000000	0.000000	0.000000	0.000000	0.101530
4	56.25 - 78.75	0.108484	0.019471	0.000000	0.000000	0.000000	0.000000	0.127955
5	78.75 - 101.25	0.034771	0.008345	0.000000	0.000000	0.000000	0.000000	0.043115
6	101.25 - 123.75	0.037552	0.013908	0.000000	0.000000	0.000000	0.000000	0.051460
7	123.75 - 146.25	0.036161	0.020862	0.001391	0.000000	0.000000	0.000000	0.058414
8	146.25 - 168.75	0.029207	0.008345	0.001391	0.000000	0.000000	0.000000	0.038943
9	168.75 - 191.25	0.012517	0.015299	0.001391	0.000000	0.000000	0.000000	0.029207
10	191.25 - 213.75	0.020862	0.013908	0.002782	0.002782	0.000000	0.000000	0.040334
11	213.75 - 236.25	0.015299	0.040334	0.018081	0.001391	0.000000	0.000000	0.075104
12	236.25 - 258.75	0.025035	0.026426	0.011127	0.000000	0.000000	0.000000	0.062587
13	258.75 - 281.25	0.006954	0.015299	0.004172	0.002782	0.000000	0.000000	0.029207
14	281.25 - 303.75	0.005563	0.016690	0.036161	0.002782	0.000000	0.000000	0.061196
15	303.75 - 326.25	0.005563	0.029207	0.048679	0.001391	0.000000	0.000000	0.084840
16	326.25 - 348.75	0.008345	0.027816	0.027816	0.011127	0.000000	0.000000	0.075104
	<b>Sub-Total</b>	<b>0.446453</b>	<b>0.349096</b>	<b>0.161335</b>	<b>0.022253</b>	<b>0.000000</b>	<b>0.000000</b>	<b>0.977778</b>
	Calms							<b>0.020833</b>
	Missing/Incomplete							<b>0.001389</b>
	Total							<b>1.000000</b>

#### SUMMARY OF WIND PATTERN

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
Jan-Feb-March-2018	ENE (12.79%)	NNE (10.15%)	2.08 %



**Figure.01: Wind Class Frequency Distribution (Jan-Feb-March-2018).**



**Figure.02: Wind Rose Diagram (Jan-Feb-March-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 excavation and 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 the machineries have been provided with control equipment. Noise monitoring carried out on monthly basis at mining site; Core Zone and Buffer Zone are as 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), Leq.

### **Method of Monitoring**

Sound Pressure Level (SPL) measurements were monitored at eight 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 eight 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.

Noise levels monitored during day and night at eight locations are found to be below in the Mining Area than the stipulated standard of CPCB for Industrial area as 75dB(A) and 70dB(A) for day and night respectively as given in **(Table15)**.

## **2.0 Water Quality Monitoring**

The existing status of water quality for ground water and surface water was assessed by collecting the water samples from underground wells from the mining area/old kudag.

The purpose of the study is to assess the water quality characteristics for critical parameters, evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity and identification of impact on water quality by this project and related activities.

The physico-chemical analysis of water samples collected during the study period is given in **(Table16 and Fig.5)**. 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. Thus the impacts due to mining activities have been found to be insignificant.

The drinking water is supplied by the tankers from far away sources. Hence, additional care now be taken to chlorinate the tankers before leaving the supply source.

The water sample from Nallahs near Mines Area was collected to know its chemical characteristics in order to find out the use of water for various utilities in the mine area. As per IS : 10500:2012 for surface water results are within the permissible limit so that the water can be used after chlorination.

The drinking water is supplied by the tankers from far away sources. Hence, additional care now be taken to chlorinate the tankers before leaving the supply source.



	<b>Hindalco Industries Limited</b> <b>Kudag Mining Environmental Status Report for</b> <b>January-2018 To March-2018</b>	<b>Details of Salient</b> <b>Features</b>
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**Table 6**  
**Statistical Analysis of SPM**

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
<b>Fugitive Emission (Core Zone):-</b>						
<b>Sairaidh Campus</b>	January-2018	178	235	207	207	234
	February-2018	216	278	247	247	277
	March-2018	206	230	218	218	230
<b>New Kudag/Nr. Weigh Bridge</b>	January-2018	185	241	213	213	240
	February-2018	209	282	246	246	281
	March-2018	169	251	210	210	249
<b>Old Kudag/Mining Area</b>	January-2018	222	283	253	253	282
	February-2018	249	290	270	270	289
	March-2018	219	258	239	239	257
<b>Khas Kudag</b>	January-2018	176	236	206	206	235
	February-2018	220	284	252	252	283
	March-2018	190	255	223	223	254
<b>CPCB Standard</b>		---				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	January-2018	120	168	144	144	167
	February-2018	142	191	167	167	190
	March-2018	131	174	153	153	173
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	January-2018	134	183	159	159	182
	February-2018	165	210	188	188	209
	March-2018	144	199	172	172	198
<b>Rajendrapur</b>	January-2018	135	201	168	168	200
	February-2018	147	190	169	169	189
	March-2018	154	196	175	175	195
<b>Tatijharia Village</b>	January-2018	150	214	182	182	213
	February-2018	162	225	194	194	224
	March-2018	152	209	181	181	208
<b>CPCB Standard</b>		---				

**Conclusion-A:-**

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-March-2018 Avg. of SPM is  $224 \mu\text{g}/\text{m}^3$ .
  - 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Avg. of SPM is  $223 \mu\text{g}/\text{m}^3$ .
  - 3) **Old Kudag/Mining Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of SPM is  $254 \mu\text{g}/\text{m}^3$ .
  - 4) **Khas Kudag Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of SPM is  $227 \mu\text{g}/\text{m}^3$ .
- The Average Concentration of SPM within the core zone of Kudag Lease is  $232 \mu\text{g}/\text{m}^3$ .

**Conclusion-B:-**

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of SPM is  $155 \mu\text{g}/\text{m}^3$ .
  - 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of SPM is  $173 \mu\text{g}/\text{m}^3$ .
  - 3) **Rajendrapur Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of SPM is  $171 \mu\text{g}/\text{m}^3$ .
  - 4) **Tatijharia Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of SPM is  $186 \mu\text{g}/\text{m}^3$ .
- The Average Concentration of SPM within the Buffer Zone of Kudag Lease is  $171 \mu\text{g}/\text{m}^3$

**Month wise Summary of Statistical Analysis of SPM**

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

**2.1.1 Presentation of Results.**

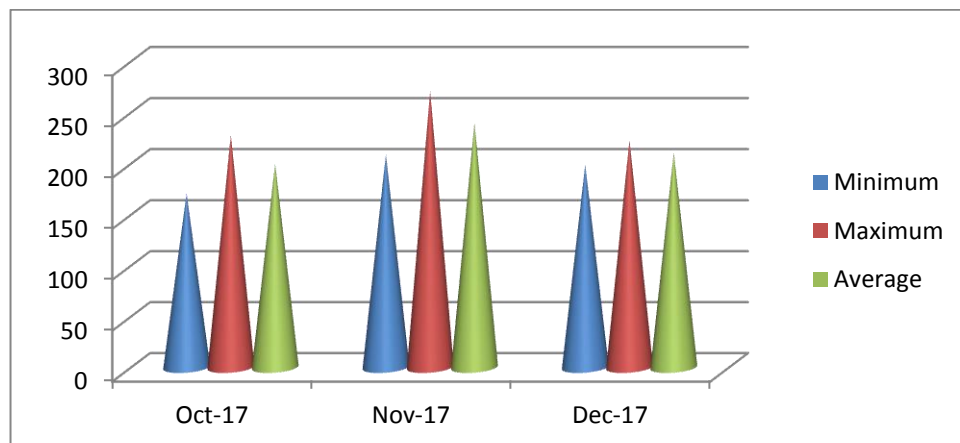
The summary of Statistical Analysis of SPM results for the month of January-2018 to March-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Sairaidh Campus**

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as 178µg/m<sup>3</sup> and 235µg/m<sup>3</sup> respectively and average concentration of 207µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as 216µg/m<sup>3</sup> and 278µg/m<sup>3</sup> respectively and average concentration of 247µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as 206µg/m<sup>3</sup> and 230µg/m<sup>3</sup> respectively and average concentration of 218µg/m<sup>3</sup>.



**Graph :- Sairaidh Campus**

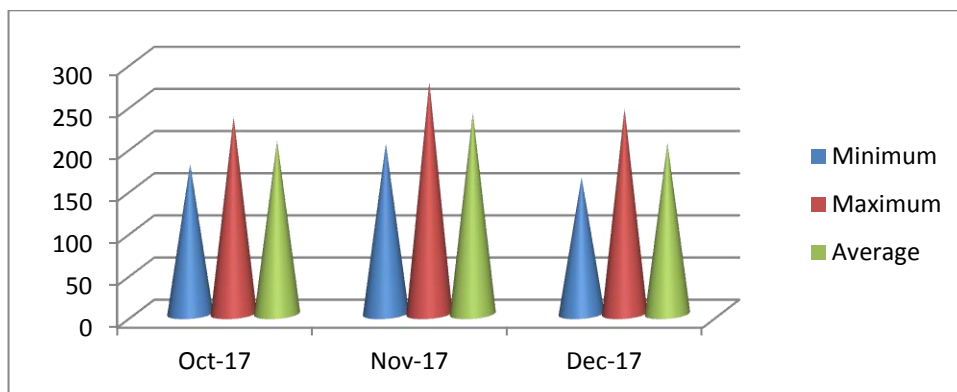


**New Kudag/Nr.Weigh Bridge**

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as  $185\mu\text{g}/\text{m}^3$  and  $241\mu\text{g}/\text{m}^3$  respectively and average concentration of  $213\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as  $209\mu\text{g}/\text{m}^3$  and  $282\mu\text{g}/\text{m}^3$  respectively and average concentration of  $246\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as  $169\mu\text{g}/\text{m}^3$  and  $251\mu\text{g}/\text{m}^3$  respectively and average concentration of  $210\mu\text{g}/\text{m}^3$ .



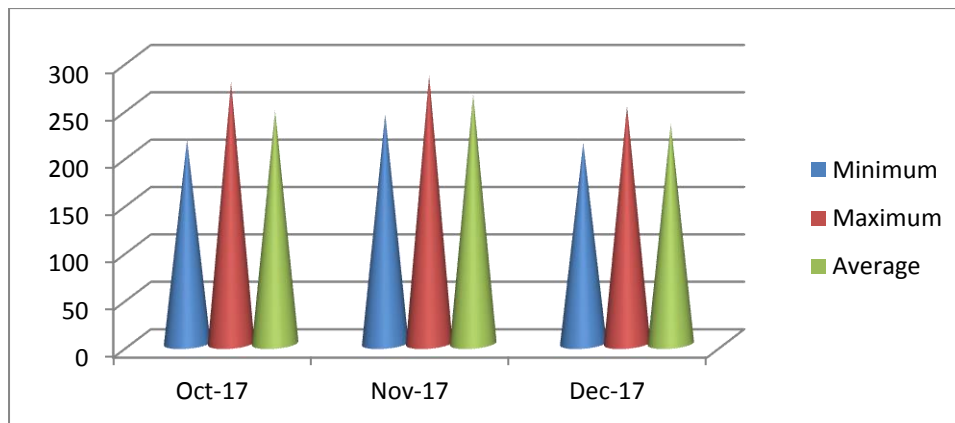
**Graph: - New Kudag/Nr.Weigh Bridge**

**Old Kudag/Mining Area**

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as 222 $\mu\text{g}/\text{m}^3$  and 283 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 253 $\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as 249 $\mu\text{g}/\text{m}^3$  and 290 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 270 $\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as 219 $\mu\text{g}/\text{m}^3$  and 258 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 239 $\mu\text{g}/\text{m}^3$ .



**Graph: - Old Kudag/Mining Area**

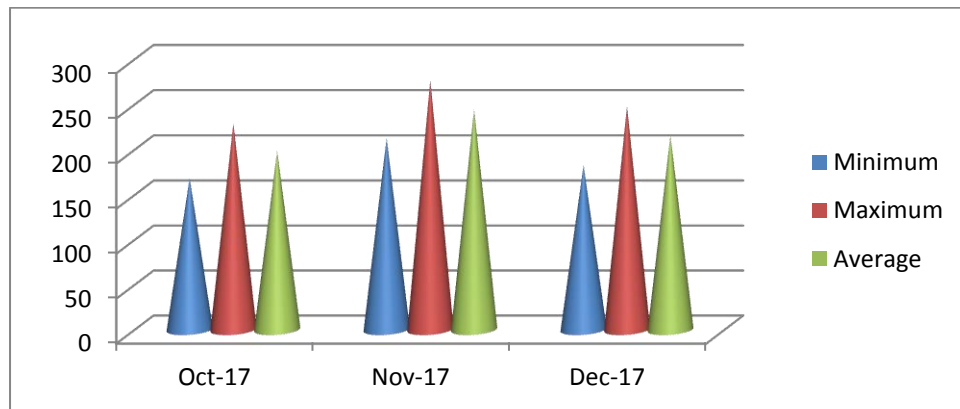


**Khas Kudag**

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as  $176\mu\text{g}/\text{m}^3$  and  $236\mu\text{g}/\text{m}^3$  respectively and average concentration of  $206\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as  $220\mu\text{g}/\text{m}^3$  and  $284\mu\text{g}/\text{m}^3$  respectively and average concentration of  $252\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as  $190\mu\text{g}/\text{m}^3$  and  $255\mu\text{g}/\text{m}^3$  respectively and average concentration of  $223\mu\text{g}/\text{m}^3$ .



**Graph: - Khas Kudag**

## 2.2 Fugitive Emission (Buffer Zone):-

### 2.2.1 Presentation of Results.

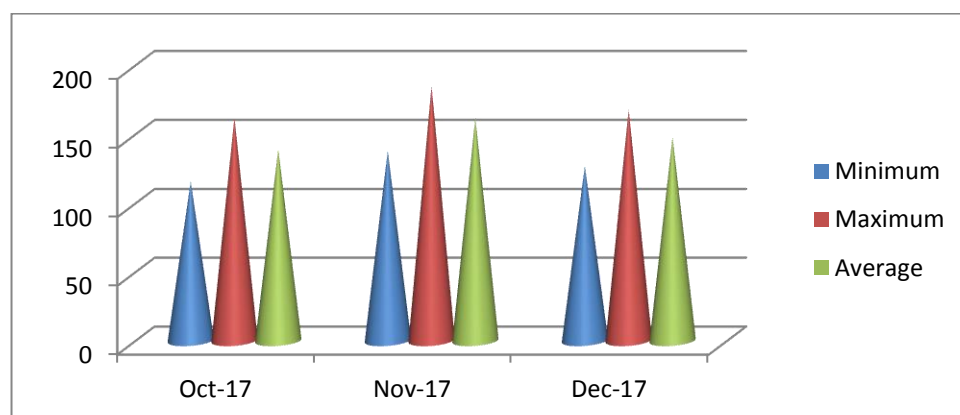
The summary of Statistical Analysis of SPM results for the month of January-2018 to March-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Jaljali Village

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as  $120\mu\text{g}/\text{m}^3$  and  $168\mu\text{g}/\text{m}^3$  respectively and average concentration of  $144\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as  $142\mu\text{g}/\text{m}^3$  and  $191\mu\text{g}/\text{m}^3$  respectively and average concentration of  $167\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as  $131\mu\text{g}/\text{m}^3$  and  $174\mu\text{g}/\text{m}^3$  respectively and average concentration of  $153\mu\text{g}/\text{m}^3$ .



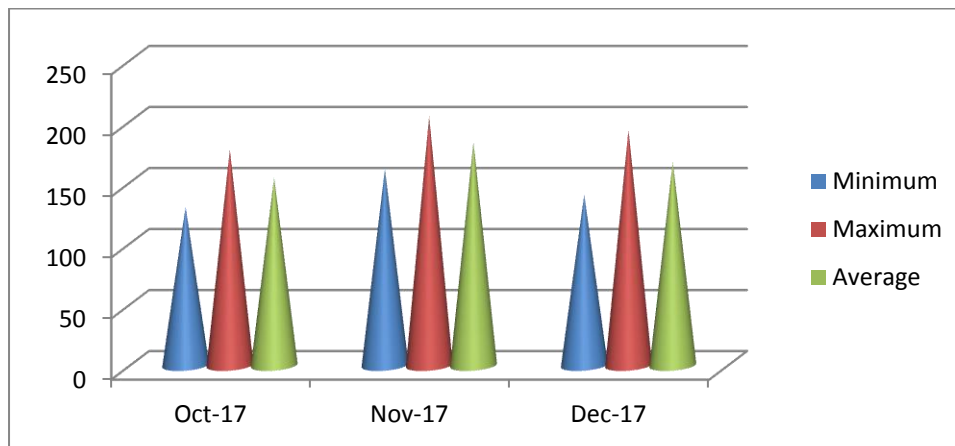
**Graph: - Jaljali Village**

**Samri Chowk/Nr.Old Weigh Bridge**

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as 134 $\mu\text{g}/\text{m}^3$  and 183 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 159 $\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as 165 $\mu\text{g}/\text{m}^3$  and 210 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 188 $\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as 144 $\mu\text{g}/\text{m}^3$  and 199 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 172 $\mu\text{g}/\text{m}^3$ .



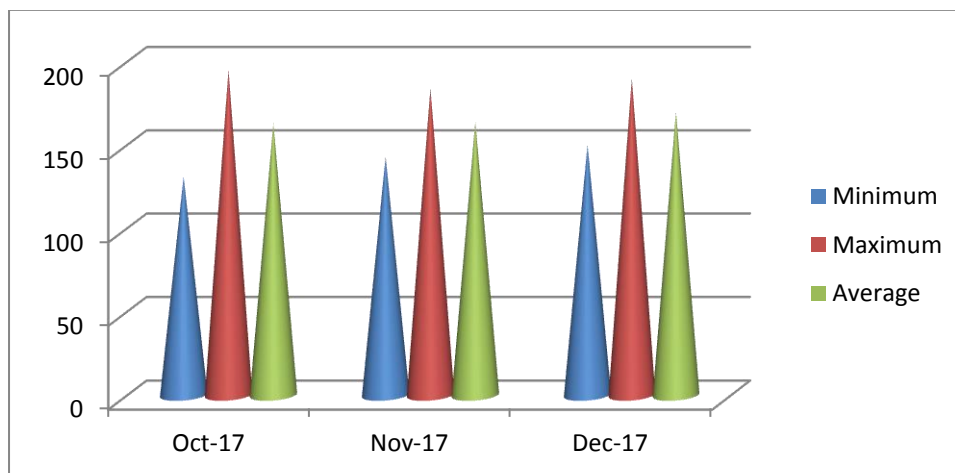
**Graph:- Samri Chowk/Nr.Old Weigh Bridge**

### Rajendrapur

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as  $135\mu\text{g}/\text{m}^3$  and  $201\mu\text{g}/\text{m}^3$  respectively and average concentration of  $168\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as  $147\mu\text{g}/\text{m}^3$  and  $190\mu\text{g}/\text{m}^3$  respectively and average concentration of  $169\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as  $154\mu\text{g}/\text{m}^3$  and  $196\mu\text{g}/\text{m}^3$  respectively and average concentration of  $175\mu\text{g}/\text{m}^3$ .



**Graph:- Rajendrapur**



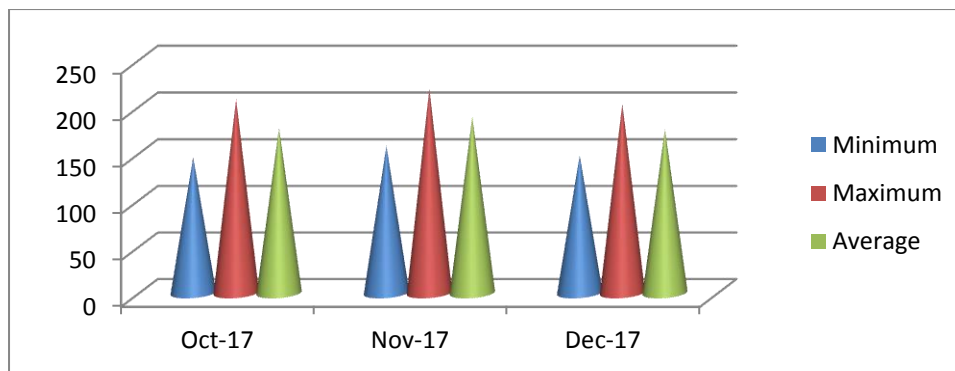


**Tatijharia Village**

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as  $150\mu\text{g}/\text{m}^3$  and  $214\mu\text{g}/\text{m}^3$  respectively and average concentration of  $182\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as  $162\mu\text{g}/\text{m}^3$  and  $225\mu\text{g}/\text{m}^3$  respectively and average concentration of  $194\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as  $152\mu\text{g}/\text{m}^3$  and  $209\mu\text{g}/\text{m}^3$  respectively and average concentration of  $181\mu\text{g}/\text{m}^3$ .



**Graph: - Tatijharia Village**



**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>						
<b>Sairaidh Campus</b>	January-2018	57	64	61	61	64
	February-2018	64	72	68	68	72
	March-2018	61	69	65	65	69
<b>New Kudag/Nr. Weigh Bridge</b>	January-2018	62	74	68	68	74
	February-2018	65	72	69	69	72
	March-2018	58	67	63	63	67
<b>Old Kudag/Mining Area</b>	January-2018	56	66	61	61	66
	February-2018	61	72	67	67	72
	March-2018	63	71	67	67	71
<b>Khas Kudag</b>	January-2018	52	74	63	63	74
	February-2018	59	63	61	61	63
	March-2018	61	68	65	65	68
<b>CPCB Standard</b>		<b>100 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	January-2018	48	57	53	53	57
	February-2018	53	62	58	58	62
	March-2018	50	54	52	52	54
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	January-2018	57	64	61	61	64
	February-2018	61	68	65	65	68
	March-2018	54	63	59	59	63
<b>Rajendrapur</b>	January-2018	56	61	59	59	61
	February-2018	62	68	65	65	68
	March-2018	57	63	60	60	63
<b>Tatijharia Village</b>	January-2018	51	58	55	55	58
	February-2018	53	61	57	57	61
	March-2018	60	67	64	64	67
<b>CPCB Standard</b>		<b>100 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

**Conclusion-A:-**

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $65\mu\text{g}/\text{m}^3$ .
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $67\mu\text{g}/\text{m}^3$ .
- 3) **Old Kudag/Mining Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $65\mu\text{g}/\text{m}^3$ .
- 4) **Khas Kudag Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $63\mu\text{g}/\text{m}^3$ .

- The Average Concentration of RSPM within the core zone of Kudag Lease is  $65\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion-B:-**

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $54\mu\text{g}/\text{m}^3$ .
  - 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $62\mu\text{g}/\text{m}^3$ .
  - 3) **Rajendrapur Lease Area Buffer Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $61\mu\text{g}/\text{m}^3$ .
  - 4) **Tatijharia Village Lease Area Buffer Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of RSPM is  $59\mu\text{g}/\text{m}^3$ .
- The Average Concentration of RSPM within the Buffer Zone of Kudag Lease is  $59\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

### Month wise Summary of Statistical Analysis of RSPM

#### 2.3 Fugitive Emission (Core Zone):-

##### 2.3.1 Presentation of Results.

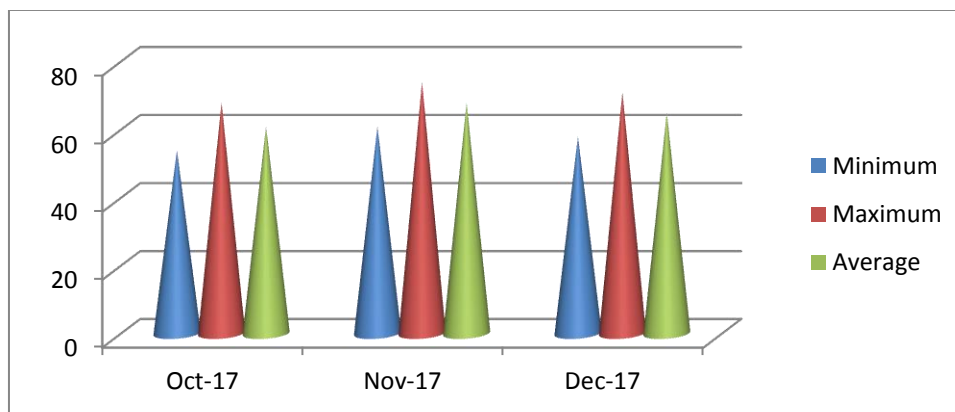
The summary of Statistical Analysis of RSPM results for the month of January-2018 to March-2018 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Sairaidh Campus

For the month of January-2018 the minimum and maximum concentrations for RSPM were recorded as  $57\mu\text{g}/\text{m}^3$  and  $64\mu\text{g}/\text{m}^3$  respectively and average concentration of  $61\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for RSPM were recorded as  $64\mu\text{g}/\text{m}^3$  and  $72\mu\text{g}/\text{m}^3$  respectively and average concentration of  $68\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $69\mu\text{g}/\text{m}^3$  respectively and average concentration of  $65\mu\text{g}/\text{m}^3$ .



**Graph :- Sairaidh Campus**

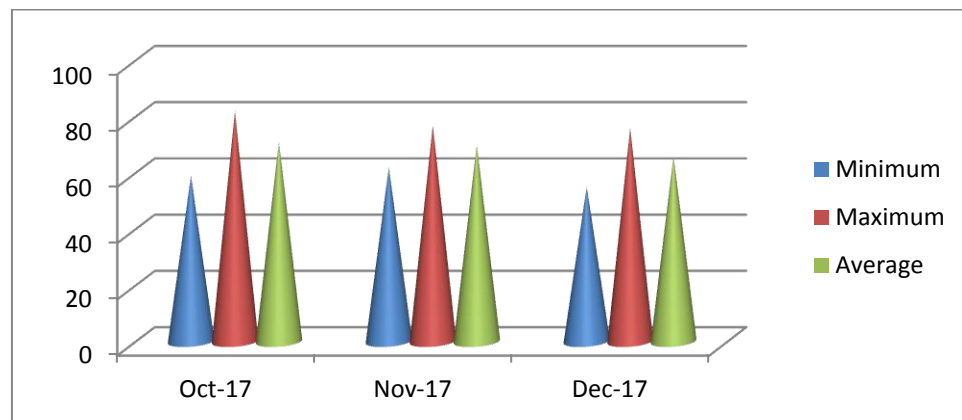


**New Kudag/Nr.Weigh Bridge**

For the month of January-2018 the minimum and maximum concentrations for RSPM were recorded as  $62\mu\text{g}/\text{m}^3$  and  $74\mu\text{g}/\text{m}^3$  respectively and average concentration of  $68\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for RSPM were recorded as  $65\mu\text{g}/\text{m}^3$  and  $72\mu\text{g}/\text{m}^3$  respectively and average concentration of  $69\mu\text{g}/\text{m}^3$ .

For the month of March-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  $63\mu\text{g}/\text{m}^3$ .



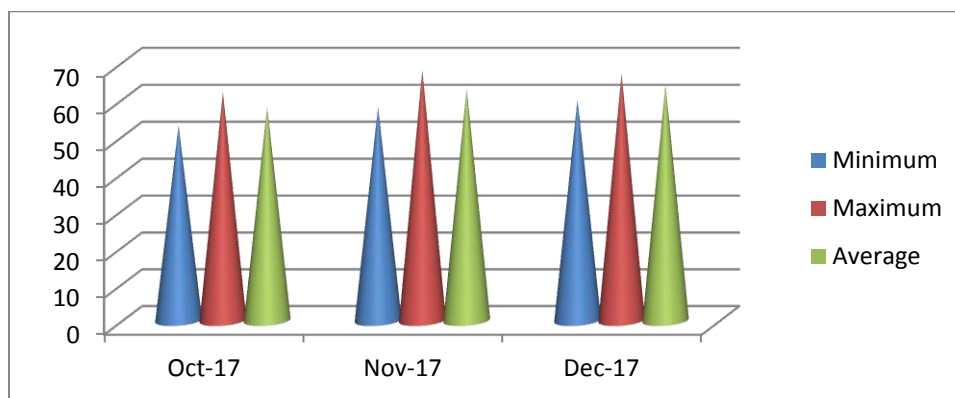
**Graph: - New Kudag/Nr.Weigh Bridge**

### **Old Kudag/Mining Area**

For the month of October-2017 the minimum and maximum concentrations for RSPM were recorded as  $56\mu\text{g}/\text{m}^3$  and  $66\mu\text{g}/\text{m}^3$  respectively and average concentration of  $61\mu\text{g}/\text{m}^3$ .

For the month of November-2017 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $72\mu\text{g}/\text{m}^3$  respectively and average concentration of  $67\mu\text{g}/\text{m}^3$ .

For the month of December-2017 the minimum and maximum concentrations for RSPM were recorded as  $63\mu\text{g}/\text{m}^3$  and  $71\mu\text{g}/\text{m}^3$  respectively and average concentration of  $67\mu\text{g}/\text{m}^3$ .



**Graph: - Old Kudag/Mining Area**

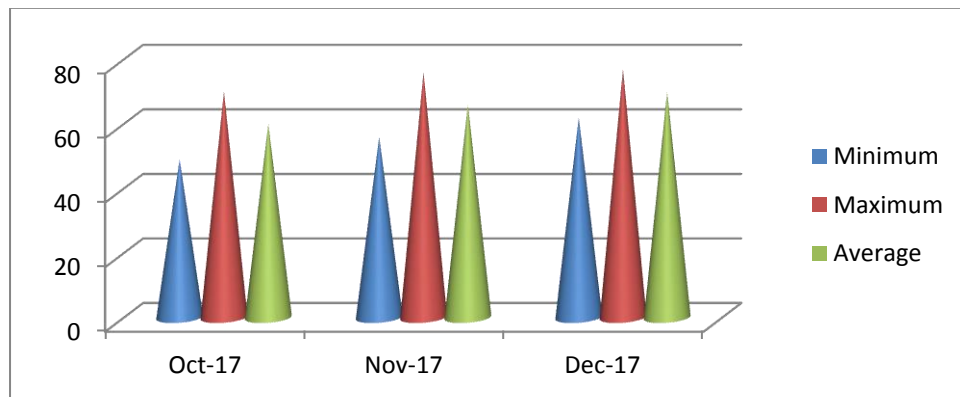


**Khas Kudag**

For the month of January-2018 the minimum and maximum concentrations for RSPM were recorded as  $52\mu\text{g}/\text{m}^3$  and  $74\mu\text{g}/\text{m}^3$  respectively and average concentration of  $63\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for RSPM were recorded as  $59\mu\text{g}/\text{m}^3$  and  $63\mu\text{g}/\text{m}^3$  respectively and average concentration of  $61\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $68\mu\text{g}/\text{m}^3$  respectively and average concentration of  $65\mu\text{g}/\text{m}^3$ .



**Graph: - Khas Kudag**

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

**2.4.1 Presentation of Results.**

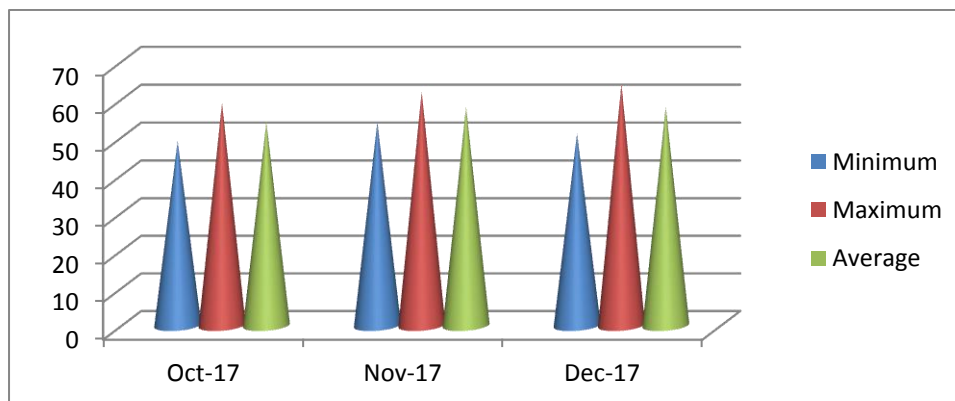
The summary of Statistical Analysis of RSPM results for the month of January-2018 to March-2018 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Jaljali Village**

For the month of January-2018 the minimum and maximum concentrations for RSPM were recorded as 48µg/m<sup>3</sup> and 57µg/m<sup>3</sup> respectively and average concentration of 53µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for RSPM were recorded as 53µg/m<sup>3</sup> and 62µg/m<sup>3</sup> respectively and average concentration of 58µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as 50µg/m<sup>3</sup> and 54µg/m<sup>3</sup> respectively and average concentration of 52µg/m<sup>3</sup>.



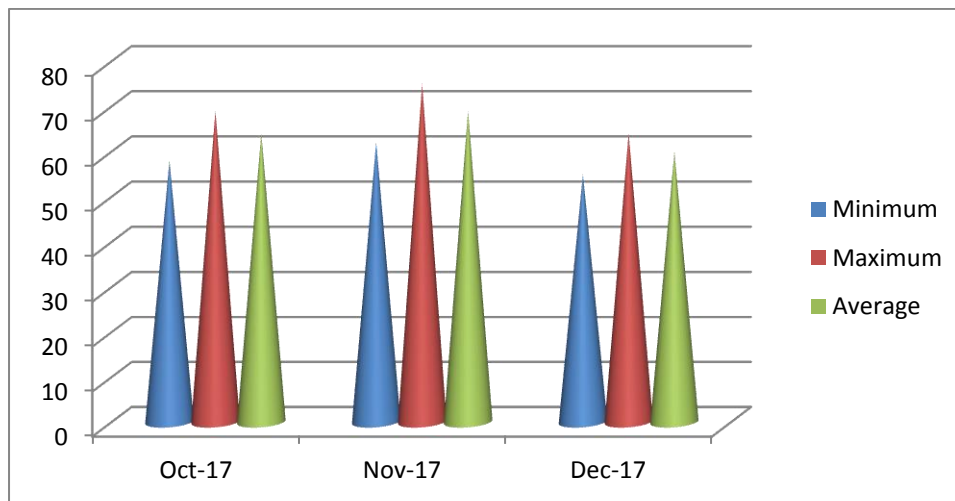
**Graph: - Jaljali Village**

**Samri Chowk/Nr.Old Weigh Bridge**

For the month of January-2018 the minimum and maximum concentrations for RSPM were recorded as  $57\mu\text{g}/\text{m}^3$  and  $64\mu\text{g}/\text{m}^3$  respectively and average concentration of  $61\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $68\mu\text{g}/\text{m}^3$  respectively and average concentration of  $65\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as  $54\mu\text{g}/\text{m}^3$  and  $63\mu\text{g}/\text{m}^3$  respectively and average concentration of  $59\mu\text{g}/\text{m}^3$ .



**Graph: - Samri Chowk/Nr.Old Weigh Bridge**

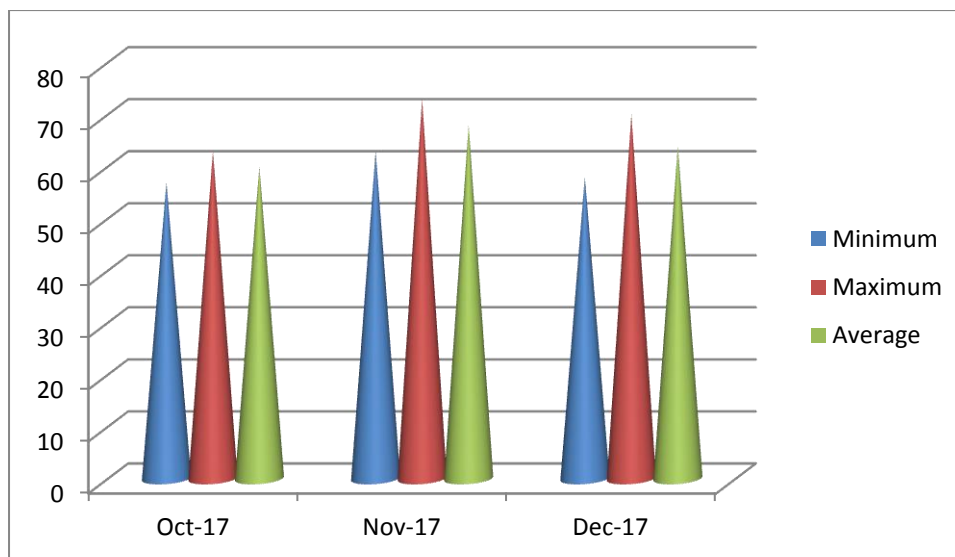


**Rajendrapur**

For the month of January-2018 the minimum and maximum concentrations for RSPM were recorded as  $56\mu\text{g}/\text{m}^3$  and  $61\mu\text{g}/\text{m}^3$  respectively and average concentration of  $59\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for RSPM were recorded as  $62\mu\text{g}/\text{m}^3$  and  $68\mu\text{g}/\text{m}^3$  respectively and average concentration of  $65\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as  $57\mu\text{g}/\text{m}^3$  and  $63\mu\text{g}/\text{m}^3$  respectively and average concentration of  $60\mu\text{g}/\text{m}^3$ .



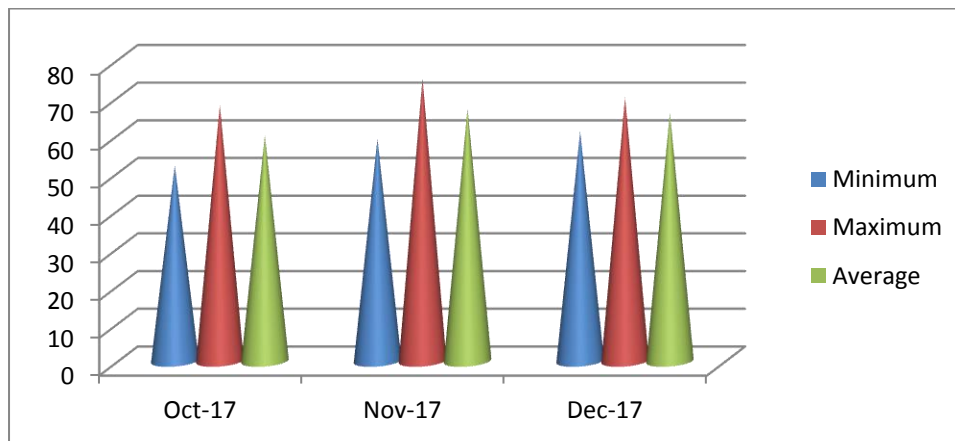
**Graph:- Rajendrapur**

**Tatijharia Village**

For the month of January-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  $55\mu\text{g}/\text{m}^3$ .

For the month of February-2018 the minimum and maximum concentrations for RSPM were recorded as  $53\mu\text{g}/\text{m}^3$  and  $61\mu\text{g}/\text{m}^3$  respectively and average concentration of  $57\mu\text{g}/\text{m}^3$ .

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as  $60\mu\text{g}/\text{m}^3$  and  $67\mu\text{g}/\text{m}^3$  respectively and average concentration of  $64\mu\text{g}/\text{m}^3$ .



**Graph:- Tatijharia Village**

	<b>Hindalco Industries Limited</b> <b>Kudag Mining Environmental Status Report for</b> <b>January-2018 To March-2018</b>	<b>Details of Salient</b> <b>Features</b>
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**Table 8**  
**Statistical Analysis of PM<sub>2.5</sub>**

Location	Month & Year	Min.	Max.	Unit: µg/m <sup>3</sup>		
				A.M.	G.M.	98%
<b>Sairaidh Campus</b>	January-2018	21	28	25	25	28
	February-2018	24	31	28	28	31
	March-2018	19	27	23	23	27
<b>CPCB Standard</b>				<b>60 µg/m<sup>3</sup></b> <b>(24 hrs)</b>		

**Conclusion :-**

The Average Concentration of PM<sub>2.5</sub> within Kudag Lease during this period (Jan-Feb-Mar-2018) is 25µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.

**Monthwise Summary of Statistical Analysis of PM<sub>2.5</sub>**

**2.5 Presentation of Results.**

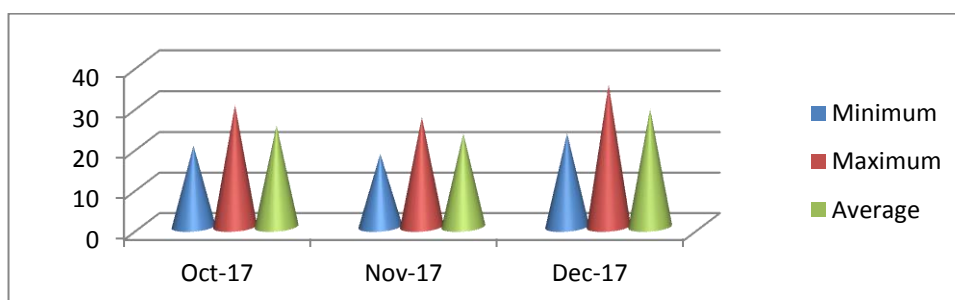
The summary of Statistical Analysis of PM<sub>2.5</sub> results for the month of January-2018 to March-2018 are presented in detail in **Table 8**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Sairaidh Campus**

For the month of January-2018 the minimum and maximum concentrations for PM<sub>2.5</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>.

For the month of February-2018 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 24µg/m<sup>3</sup> and 31µg/m<sup>3</sup> respectively and average concentration of 28µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 19µg/m<sup>3</sup> and 27µg/m<sup>3</sup> respectively and average concentration of 23µg/m<sup>3</sup>.





**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>						
<b>Sairaidh Campus</b>	January-2018	10	15	13	13	15
	February-2018	11	16	14	14	16
	March-2018	10	15	13	13	15
<b>New Kudag/Nr. Weigh Bridge</b>	January-2018	11	13	12	12	13
	February-2018	9	11	10	10	11
	March-2018	11	15	13	13	15
<b>Old Kudag/Mining Area</b>	January-2018	9	13	11	11	13
	February-2018	11	16	14	14	16
	March-2018	9	14	12	12	14
<b>Khas Kudag</b>	January-2018	11	15	13	13	15
	February-2018	9	13	11	11	13
	March-2018	11	15	13	13	15
<b>CPCB Standard</b>		<b>80 µg/m<sup>3</sup></b> <b>(24 hrs)</b>				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	January-2018	8	10	9	9	10
	February-2018	7	9	8	8	9
	March-2018	8	10	9	9	10
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	January-2018	9	13	11	11	13
	February-2018	10	14	12	12	14
	March-2018	9	12	11	11	12
<b>Rajendrapur</b>	January-2018	8	10	9	9	10
	February-2018	9	13	11	11	13
	March-2018	8	10	9	9	10
<b>Tatijharia Village</b>	January-2018	9	14	12	12	14
	February-2018	7	10	9	9	10
	March-2018	9	12	11	11	12
<b>CPCB Standard</b>		<b>80 µg/m<sup>3</sup></b> <b>(24 hrs)</b>				

**Conclusion-A:-**

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 13µg/m<sup>3</sup>.
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 12µg/m<sup>3</sup>.
- 3) **Old Kudag/Mining Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 12µg/m<sup>3</sup>.
- 4) **Khas Kudag Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 12µg/m<sup>3</sup>.

- The Average Concentration of SO<sub>2</sub> within the core zone of Kudag Lease is 12µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.

**Conclusion-B:-**

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 9.0 µg/m<sup>3</sup>.
  - 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 11µg/m<sup>3</sup>.
  - 3) **Rajendrapur Lease Area Buffer Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 10µg/m<sup>3</sup>.
  - 4) **Tatijharia Village Lease Area Buffer Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of SO<sub>2</sub> is 11µg/m<sup>3</sup>.
- The Average Concentration of SO<sub>2</sub> within the Buffer Zone of Kudag Lease is 10µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.

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

**2.6.1 Presentation of Results.**

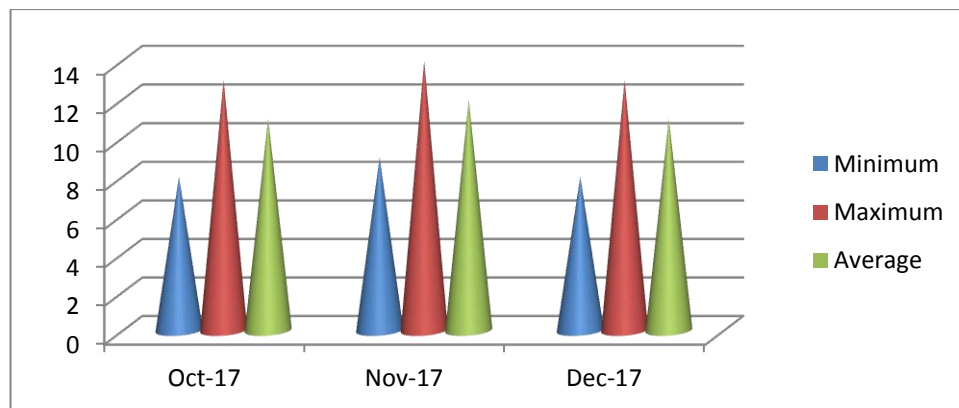
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of January-2018 to March-2018 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring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

**Sairaidh Campus**

For the month of January-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 10µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.

For the month of February-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 March-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 10µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.



**Graph :- Sairaidh Campus**

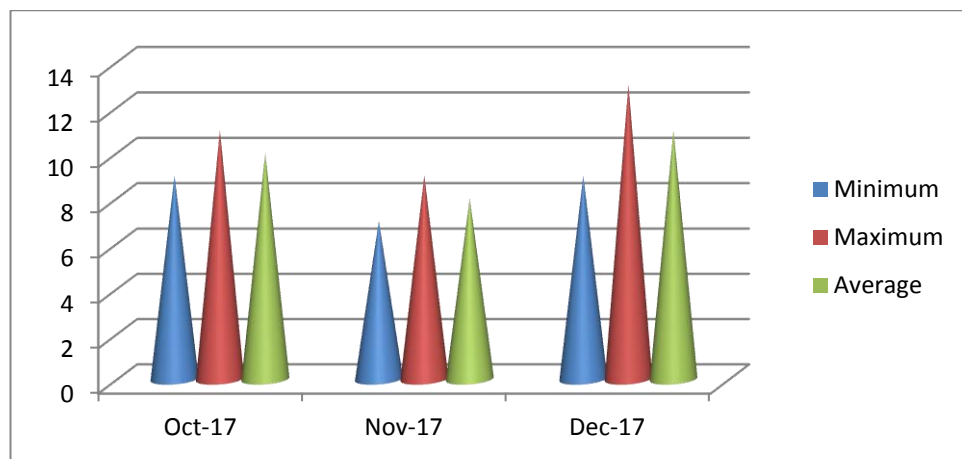
**New Kudag/Nr.Weigh Bridge**



For the month of January-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 February-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 March-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 11µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.



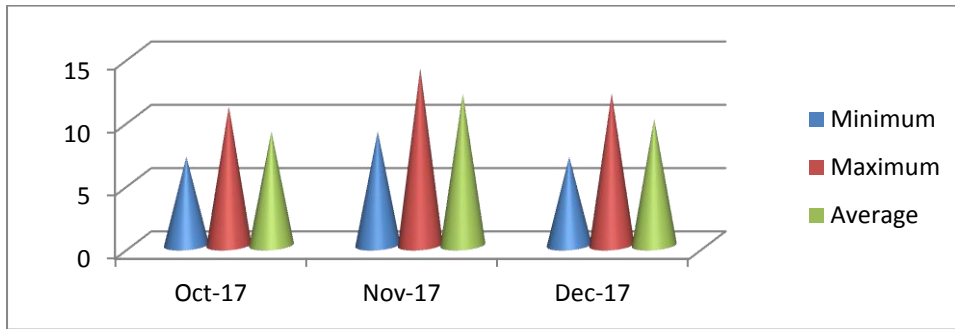
**Graph: - New Kudag/Nr.Weigh Bridge**

### **Old Kudag/Mining Area**

For the month of January-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 February-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 March-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>.



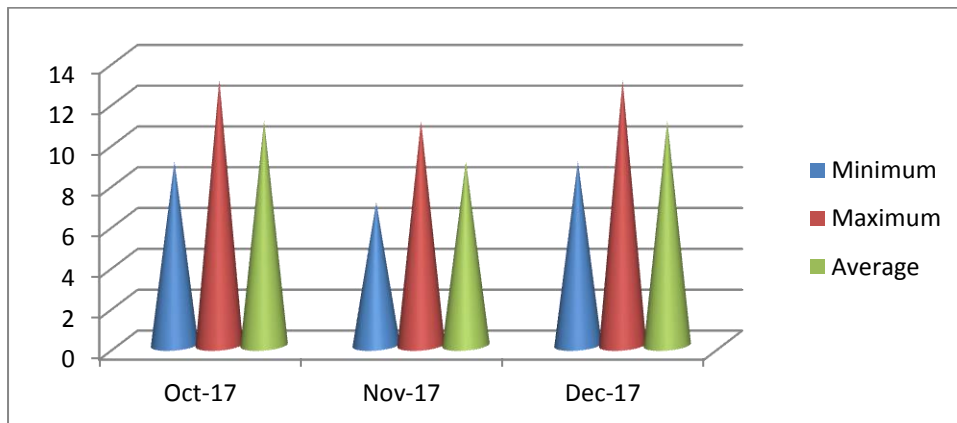
**Graph: - Old Kudag/Mining Area**

**Khas Kudag**

For the month of January-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 11µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.

For the month of February-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 March-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 11µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 13µg/m<sup>3</sup>.



**Graph: - Khas Kudag**

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

**2.7.1 Presentation of Results.**

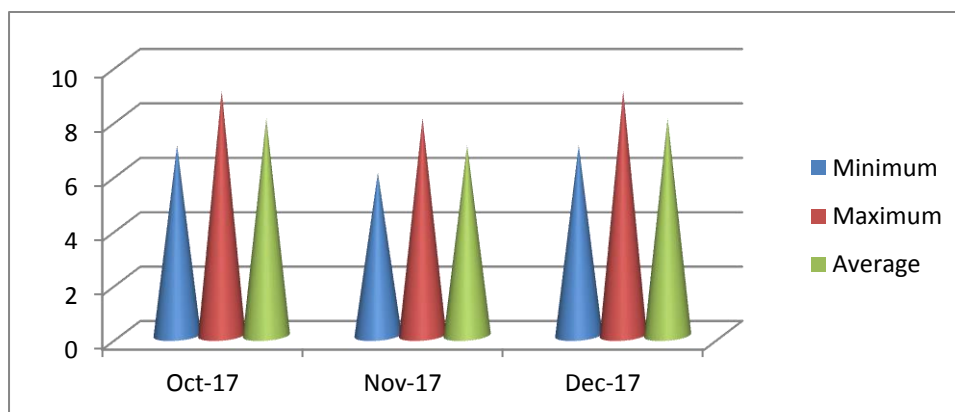
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of January-2018 to March-2018 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring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

**Jaljali Village**

For the month of January-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8.0µg/m<sup>3</sup> and 10.0µg/m<sup>3</sup> respectively and average concentration of 9.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7.0µg/m<sup>3</sup> and 9.0µg/m<sup>3</sup> respectively and average concentration of 8.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8.0µg/m<sup>3</sup> and 10.0µg/m<sup>3</sup> respectively and average concentration of 9.0µg/m<sup>3</sup>.



**Graph: - Jaljali Village**

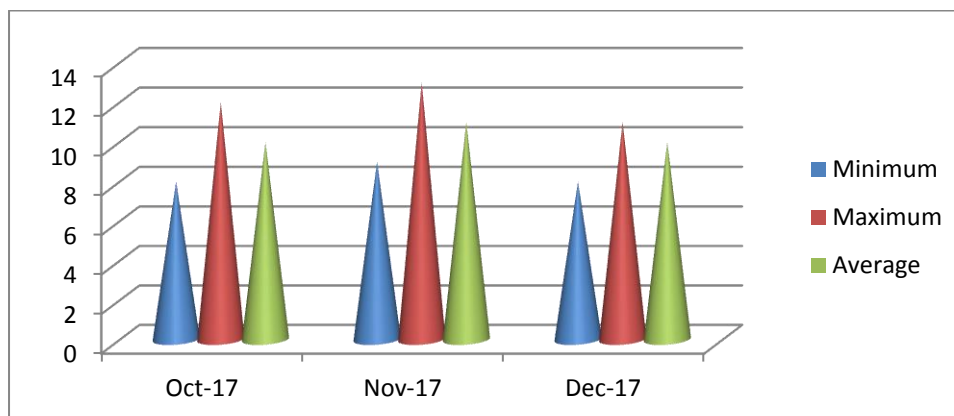


**Samri Chowk/Nr.Old Weigh Bridge**

For the month of January-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9.0µg/m<sup>3</sup> and 13.0µg/m<sup>3</sup> respectively and average concentration of 11.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 10.0µg/m<sup>3</sup> and 14.0µg/m<sup>3</sup> respectively and average concentration of 12.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9.0µg/m<sup>3</sup> and 12.0µg/m<sup>3</sup> respectively and average concentration of 11.0µg/m<sup>3</sup>.



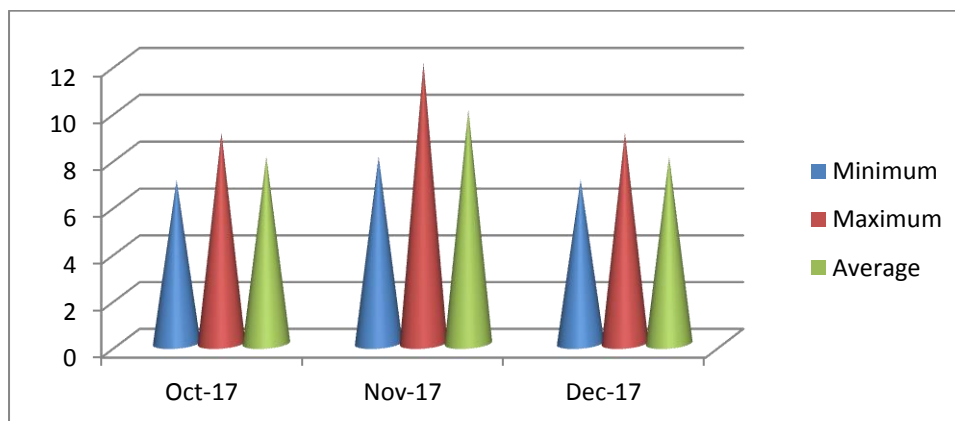
**Graph: - Samri Chowk/Nr.Old Weigh Bridge**

**Rajendrapur**

For the month of January-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8.0µg/m<sup>3</sup> and 10.0µg/m<sup>3</sup> respectively and average concentration of 9.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9.0µg/m<sup>3</sup> and 13.0µg/m<sup>3</sup> respectively and average concentration of 11.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8.0µg/m<sup>3</sup> and 10.0µg/m<sup>3</sup> respectively and average concentration of 9.0µg/m<sup>3</sup>.



**Graph: - Rajendrapur**

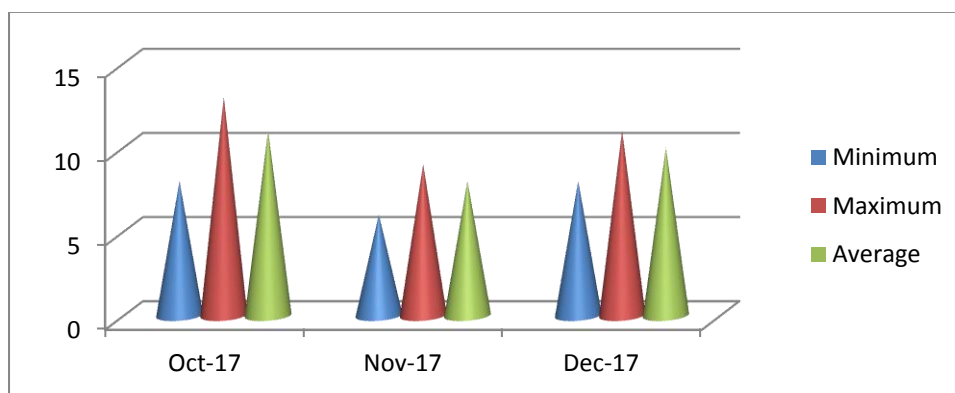


**Tatijharia Village**

For the month of January-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9.0µg/m<sup>3</sup> and 14.0µg/m<sup>3</sup> respectively and average concentration of 12.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7.0µg/m<sup>3</sup> and 10.0µg/m<sup>3</sup> respectively and average concentration of 9.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9.0µg/m<sup>3</sup> and 12.0µg/m<sup>3</sup> respectively and average concentration of 11.0µg/m<sup>3</sup>.



**Graph: - Tatijharia Village**



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

Unit: $\mu\text{g}/\text{m}^3$						
Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Sairaidh Campus</b>	January-2018	21	29	25	25	29
	February-2018	20	32	26	26	32
	March-2018	22	33	28	28	33
<b>New Kudag/Nr. Weigh Bridge</b>	January-2018	19	30	25	25	30
	February-2018	20	27	24	24	27
	March-2018	23	32	28	28	32
<b>Old Kudag/Mining Area</b>	January-2018	22	29	26	26	29
	February-2018	22	28	25	25	28
	March-2018	23	33	28	28	33
<b>Khas Kudag</b>	January-2018	22	30	26	26	30
	February-2018	20	28	24	24	28
	March-2018	22	32	27	27	32
<b>CPCB Standard</b>				<b>80 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	January-2018	14	18	16	16	18
	February-2018	16	21	19	19	21
	March-2018	15	18	17	17	18
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	January-2018	14	23	19	19	23
	February-2018	14	21	18	18	21
	March-2018	15	26	21	21	26
<b>Rajendrapur</b>	January-2018	17	23	20	20	23
	February-2018	16	24	20	20	24
	March-2018	16	21	19	19	21
<b>Tatijharia Village</b>	January-2018	14	19	17	17	19
	February-2018	16	18	17	17	18
	March-2018	14	17	16	16	17
<b>CPCB Standard</b>				<b>80 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>		

**Conclusion-A:-**

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 26 $\mu\text{g}/\text{m}^3$ .
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 26 $\mu\text{g}/\text{m}^3$ .
- 3) **Old Kudag/Mining Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 26 $\mu\text{g}/\text{m}^3$ .
- 4) **Khas Kudag Lease Area Core Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 26 $\mu\text{g}/\text{m}^3$ .

- The Average Concentration of NO<sub>x</sub> within the core zone of Kudag Lease is 26 $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion-B:-**

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 17 $\mu\text{g}/\text{m}^3$ .
  - 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 19 $\mu\text{g}/\text{m}^3$ .
  - 3) **Rajendrapur Lease Area Buffer Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 20 $\mu\text{g}/\text{m}^3$ .
  - 4) **Tatijharia Village Lease Area Buffer Zone: -** For the Months of Jan-Feb-Mar-2018 Avg. of NO<sub>x</sub> is 17 $\mu\text{g}/\text{m}^3$ .
- The Average Concentration of NO<sub>x</sub> within the Buffer Zone of Kudag Lease is 18 $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Monthwise Summary of Statistical Analysis of NO<sub>x</sub>**

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

**2.8.1 Presentation of Results.**

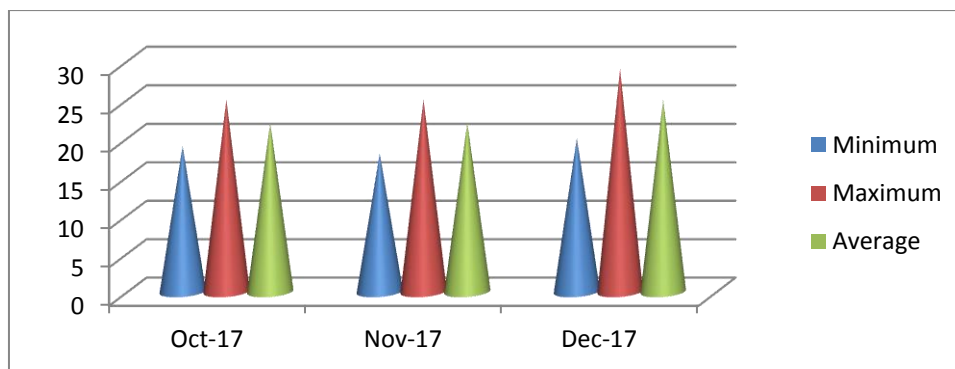
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of January-2018 to March-2018 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring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

**Sairaidh Campus**

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21.0µg/m<sup>3</sup> and 29.0µg/m<sup>3</sup> respectively and average concentration of 25.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20.0µg/m<sup>3</sup> and 32.0µg/m<sup>3</sup> respectively and average concentration of 26.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22.0µg/m<sup>3</sup> and 33.0µg/m<sup>3</sup> respectively and average concentration of 28.0µg/m<sup>3</sup>.



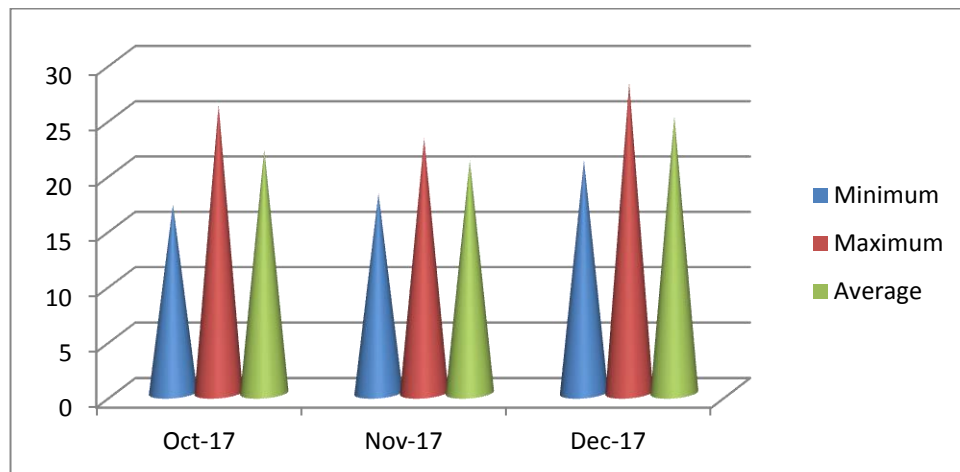
**Graph :- Sairaidh Campus**

**New Kudag/Nr.Weigh Bridge**

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 19.0µg/m<sup>3</sup> and 30.0µg/m<sup>3</sup> respectively and average concentration of 25.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20.0µg/m<sup>3</sup> and 27.0µg/m<sup>3</sup> respectively and average concentration of 24.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 23.0µg/m<sup>3</sup> and 32.0µg/m<sup>3</sup> respectively and average concentration of 28.0µg/m<sup>3</sup>.



**Graph: - New Kudag/Nr.Weigh Bridge**

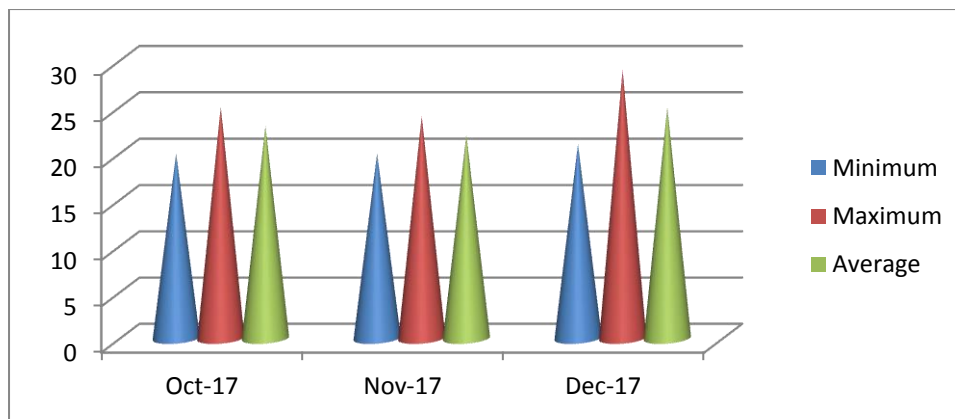


**Old Kudag/Mining Area**

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22.0µg/m<sup>3</sup> and 29.0µg/m<sup>3</sup> respectively and average concentration of 26.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22.0µg/m<sup>3</sup> and 28.0µg/m<sup>3</sup> respectively and average concentration of 25.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 23.0µg/m<sup>3</sup> and 33.0µg/m<sup>3</sup> respectively and average concentration of 28.0µg/m<sup>3</sup>.



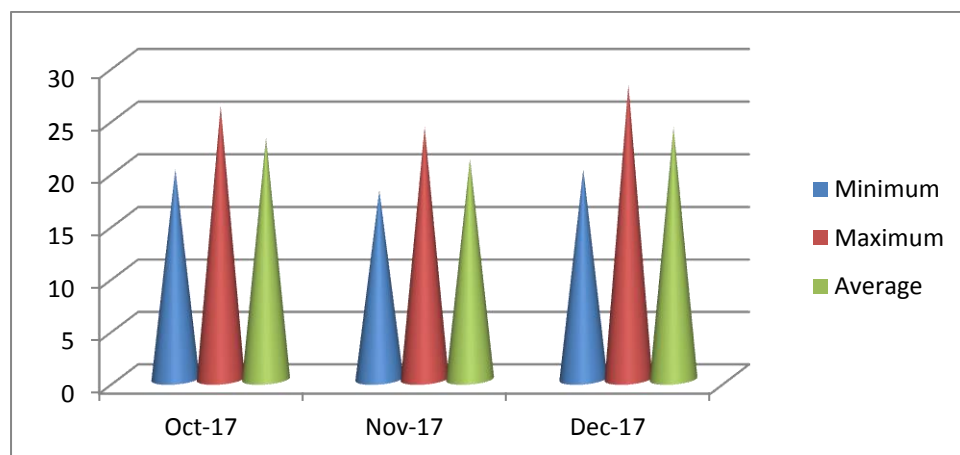
**Graph: - Old Kudag/Mining Area**

### **Khas Kudag**

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22.0µg/m<sup>3</sup> and 30.0µg/m<sup>3</sup> respectively and average concentration of 26.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20.0µg/m<sup>3</sup> and 28.0µg/m<sup>3</sup> respectively and average concentration of 24.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22.0µg/m<sup>3</sup> and 32.0µg/m<sup>3</sup> respectively and average concentration of 27.0µg/m<sup>3</sup>.



**Graph: - Khas Kudag**



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

**2.9.1 Presentation of Results.**

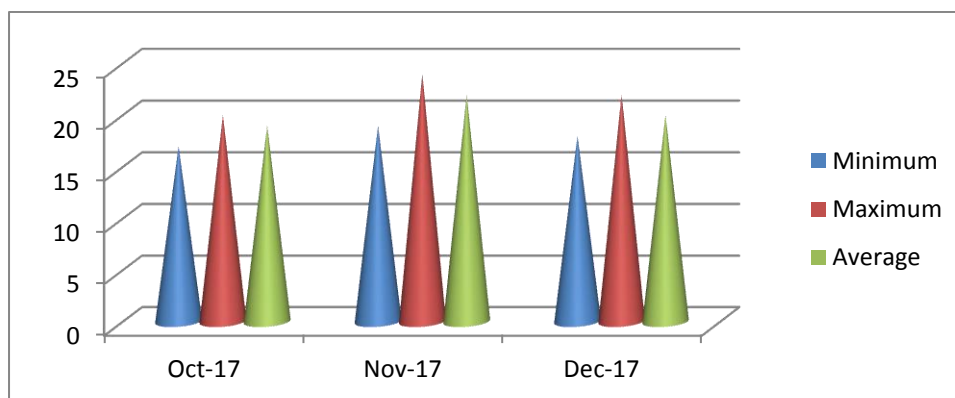
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of October-2017 to December-2017 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Jaljali Village**

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14.0µg/m<sup>3</sup> and 18.0µg/m<sup>3</sup> respectively and average concentration of 16.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16.0µg/m<sup>3</sup> and 21.0µg/m<sup>3</sup> respectively and average concentration of 19.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15.0µg/m<sup>3</sup> and 18.0µg/m<sup>3</sup> respectively and average concentration of 17.0µg/m<sup>3</sup>.



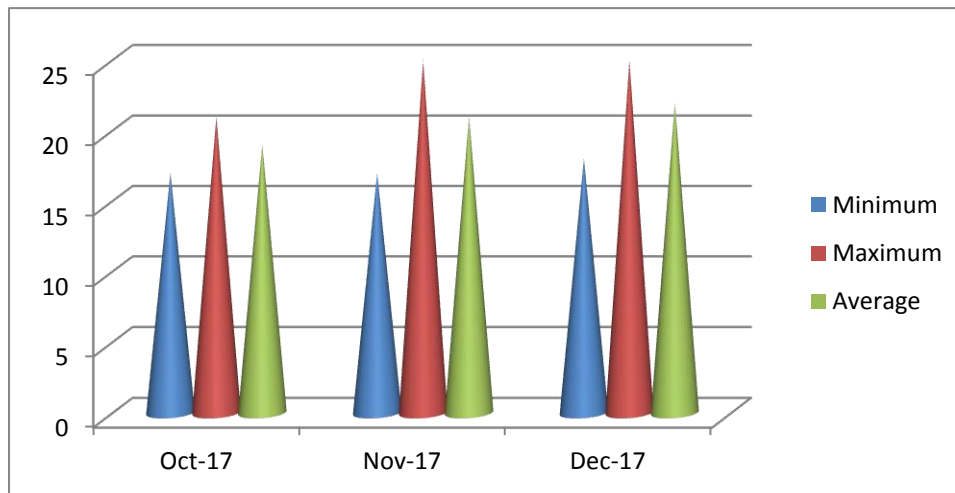
**Graph: - Jaljali Village**

**Samri Chowk/Nr.Old Weigh Bridge**

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14.0µg/m<sup>3</sup> and 23.0µg/m<sup>3</sup> respectively and average concentration of 19.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14.0µg/m<sup>3</sup> and 21.0µg/m<sup>3</sup> respectively and average concentration of 18.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15.0µg/m<sup>3</sup> and 26.0µg/m<sup>3</sup> respectively and average concentration of 21.0µg/m<sup>3</sup>.



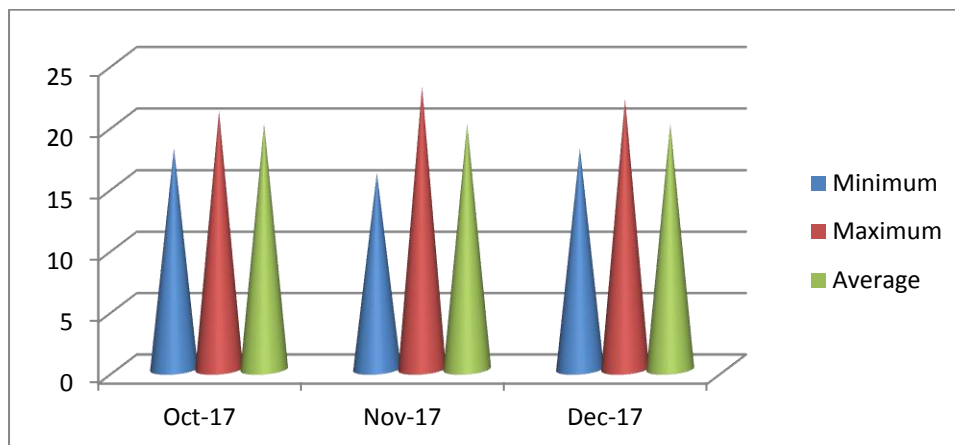
**Graph: - Samri Chowk/Nr.Old Weigh Bridge**

### Rajendrapur

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17.0µg/m<sup>3</sup> and 23.0µg/m<sup>3</sup> respectively and average concentration of 20.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16.0µg/m<sup>3</sup> and 24.0µg/m<sup>3</sup> respectively and average concentration of 20.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16.0µg/m<sup>3</sup> and 21.0µg/m<sup>3</sup> respectively and average concentration of 19.0µg/m<sup>3</sup>.



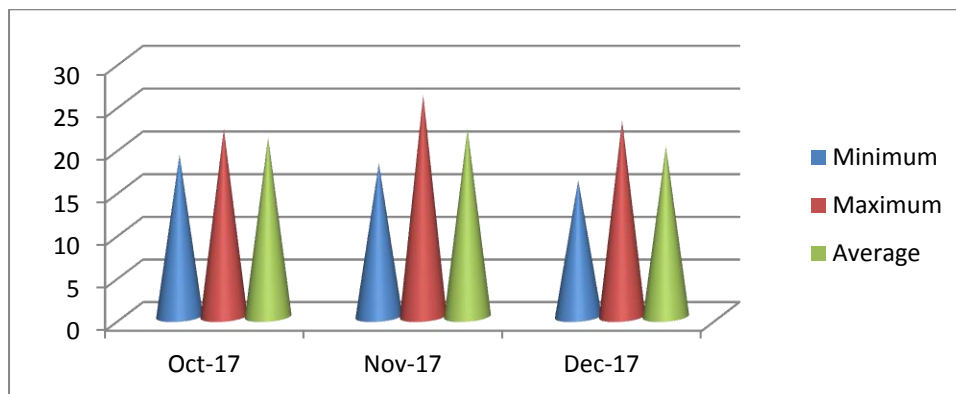
**Graph: - Rajendrapur**

**Tatijharia Village**

For the month of January-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14.0µg/m<sup>3</sup> and 19.0µg/m<sup>3</sup> respectively and average concentration of 17.0µg/m<sup>3</sup>.

For the month of February-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16.0µg/m<sup>3</sup> and 18.0µg/m<sup>3</sup> respectively and average concentration of 17.0µg/m<sup>3</sup>.

For the month of March-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14.0µg/m<sup>3</sup> and 17.0µg/m<sup>3</sup> respectively and average concentration of 16.0µg/m<sup>3</sup>.



**Graph: - Tatijharia Village**

	<b>Hindalco Industries Limited</b> <b>Kudag Mining Environmental Status Report for</b> <b>January-2018 To March-2018</b>	<b>Details of Salient</b> <b>Features</b>
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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%ile
<b>Fugitive Emission (Core Zone):-</b>						
<b>Sairaidh Campus</b>	January-2018	0.024	0.038	0.031	0.031	0.038
	February-2018	0.028	0.042	0.035	0.035	0.042
	March-2018	0.035	0.049	0.042	0.042	0.049
<b>New Kudag/Nr. Weigh Bridge</b>	January-2018	0.034	0.048	0.041	0.041	0.048
	February-2018	0.041	0.055	0.048	0.048	0.055
	March-2018	0.036	0.050	0.043	0.043	0.050
<b>Old Kudag/Mining Area</b>	January-2018	0.033	0.047	0.040	0.040	0.047
	February-2018	0.038	0.052	0.045	0.045	0.052
	March-2018	0.034	0.048	0.041	0.041	0.048
<b>Khas Kudag</b>	January-2018	0.039	0.053	0.046	0.046	0.053
	February-2018	0.043	0.057	0.050	0.050	0.057
	March-2018	0.034	0.048	0.041	0.041	0.048
<b>CPCB Standard</b>		<b>1.0 <math>\mu\text{g}/\text{m}^3</math></b> <b>(24 hrs)</b>				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Rajendrapur</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Tatijharia Village</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>		<b>1.0 <math>\mu\text{g}/\text{m}^3</math></b> <b>(24 hrs)</b>				

**Conclusion: A)**

The Average Concentration of Pb within the Core Zone of Kudag Lease during this period (Jan-Feb-March-2018) is  $0.042\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion: B)**

The Average Concentration of Pb within the Buffer Zone of Kudag Lease during this period (Jan-Feb-March-2018) was not detected at any of the locations.



**Table 12**  
**Statistical Analysis of Hg**

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Sairaidh Campus</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>New Kudag/Nr. Weigh Bridge</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Old Kudag/Mining Area</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Khas Kudag</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>	---					
<b>Buffer Zone :</b>						
<b>Jaljali Village</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Rajendrapur</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Tatijharia Village</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>	---					

**Conclusion: A**

The Average Concentration of Hg within the Core Zone of Kudag Lease during this period (Jan-Feb-March-2018) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

**Conclusion: B)**

The Average Concentration of Hg within the Buffer Zone of Kudag Lease during this period (Jan-Feb-March-2018) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

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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>Sairaidh Campus</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>New Kudag/Nr. Weigh Bridge</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Old Kudag/Mining Area</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Khas Kudag</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>	<b>06 ng/m<sup>3</sup></b> <b>(Annual)</b>					
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Rajendrapur</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>Tatijharia Village</b>	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>	<b>06 ng/m<sup>3</sup></b> <b>(Annual)</b>					

**Conclusion: A**

The Average Concentration of As within the Core Zone of Kudag Lease during this period (Jan-Feb-March-2018) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

**Conclusion: B)**

The Average Concentration of As within the Buffer Zone of Kudag Lease during this period (Jan-Feb-March-2018) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

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**Free Silica:-**

Sr. No.	Location	Measurement Unit	January-2018		February-2018		March-2018	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Old Kudag/Mining Area	g/100gm	0.28	0.17	0.32	0.18	0.24	0.16

**Table 14**  
**Dust fall rate**

Sl.No.	Location	January-2018	February-2018	March-2018	Average
<b>Rate (mt/km<sup>2</sup>/month)</b>					
1	Old Kudag/Mining Area	17.9	23.8	24.7	<b>22.1</b>
2	Khas kudag	16.8	21.9	26.1	<b>21.6</b>

**Table 15**  
**Noise Level Monitoring**

Sl. No.	Location	Unit: dB(A) Leq					
		January-2018		February-2018		March-2018	
		Day	Night	Day	Night	Day	Night
<b>Core Zone</b>							
1	<b>Sairaidh Campus</b>	52.7	41.9	56.2	43.8	61.4	46.2
2	<b>New Kudag/Near Weigh Bridge</b>	58.1	47.3	64.3	56.2	59.3	47.1
3	<b>Old Kudag/Mining Area</b>	61.8	52.6	59.1	48.6	53.7	41.9
4	<b>Khas Kudag</b>	56.3	42.8	61.4	42.7	59.1	48.6
<b>Buffer Zone</b>							
1	<b>Jaljali Village</b>	47.3	37.1	51.4	42.9	48.1	38.2
2	<b>Samri Chowk/Nr.Old Weigh Bridge</b>	54.1	43.7	48.9	38.2	51.6	41.9
3	<b>Rajendrapur</b>	48.7	36.2	51.7	41.6	49.3	37.1
4	<b>Tatijharia Village</b>	51.6	42.4	47.8	36.1	52.4	43.6

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



	<p align="center"><b>Hindalco Industries Limited</b>  <b>Kudag Mining Environmental Status Report for</b>  <b>January-2018 To March-2018</b></p>	<p align="center"><b>Details of Salient Features</b></p>
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**Table 15-A**

**HEMM Spot Noise Level Monitoring**

**Unit: dB(A) Leq**

Sr. No.	Location	January-2018			February-2018			March-2018		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	<b>New Kudag/Nr.Weigh Bridge</b>	67.1	74.8	<b>71.0</b>	69.3	72.4	<b>70.9</b>	68.1	82.4	<b>75.3</b>



**3.0 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 NO.16

**Table 16**

**Report on Chemical Examination of Ground Water**

**Location: GW1: 1) Old Kudag/Mining Area-March-2018**

**TEST RESULTS**

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	7.16 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.8
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	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.13
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	279
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.32
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	54.76
12.	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 23)	200	600	108.59
13.	Total hardness (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 21)	200	600	166.21
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	52.72
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	8.38
16.	Sulphate (as SO <sub>4</sub> )	mg/l	IS 3025 (Part 24)	200	400	38.76
17.	Nitrate (as NO <sub>3</sub> )	mg/l	APHA Method	45	No relaxation	7.94
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	< 0.1
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	< 0.01
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

**Contd.....**



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**Features**

(Contd.....)

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
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	UDECA 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	< 0.001
41.	Polynuclear aromatic hydrocarbon (PAH)	µg/l	UDECA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	---	---	< 2
43.	<i>Escherichia coli</i>	Per100 ml	IS 1622	Absent	Absent	Absent
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	UDECA 508	0.01		< 0.01
ii.	Beta HCH	µg/l	UDECA 508	0.04		< 0.03
iii.	Delta- HCH	µg/l	UDECA 508	0.04		< 0.03
iv.	Alachlor	µg/l	UDECA 508	20		< 0.03
v.	Aldrin / Dieldrin	µg/l	UDECA 508	0.03		< 0.03
vi.	Atrazine	µg/l	UDECA 1657	2		< 0.03
vii.	Butachlor	µg/l	UDECA 508	125		< 0.03
viii.	Chlorpyrifos	µg/l	UDECA 1657	30		< 0.03
ix.	DDT and its Isomers	µg/l	UDECA 508	1		< 0.03
x.	Gamma - HCH (Lindane)	µg/l	UDECA 508	2		< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	UDECA 1657	30		< 0.03
xii.	Endosulphan	µg/l	UDECA 508	0.4		< 0.03
xiii.	Ethion	µg/l	UDECA 1657	3		< 0.03
xiv.	Isoproturon	µg/l	UDECA 1657	9		< 0.03
xv.	Malathion	µg/l	UDECA 1657	190		< 0.03
xvi.	Methyl Parathion	µg/l	UDECA 1657	0.3		< 0.03
xvii.	Monocrotophos	µg/l	UDECA 1657	1		< 0.03
xviii.	Phorate	µg/l	UDECA 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. Sample complies with IS:10500:2012, for tests conducted, indicating that it is fit for drinking purpose with respect to tested parameters.



**Table 17**  
**Monthly Report on Chemical Examination of Surface Water**

**(Nalags near Mining Area)**  
**March-2018**

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	8.04 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	16
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	6
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.52
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	416
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.43
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	152.43
12.	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 23)	200	600	116.54
13.	Total hardness (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 21)	200	600	242.80
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	76.29
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	127.34
17.	Nitrate (as NO <sub>3</sub> )	mg/l	APHA Method	45	No relaxation	7.29
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	< 0.1
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	< 0.01
31.	Sulphide (as H <sub>2</sub> S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03



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32.	Chloramines (as Cl <sub>2</sub> )	mg/l	APHA 4500-Cl <sub>2</sub> G	4.0	No relaxation	< 0.01
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**Contd.....**

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

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
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	UDECA 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	< 0.001
41.	Polynuclear aromatic hydrocarbon (PAH)	µg/l	UDECA : 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
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	UDECA 508	0.01		< 0.01
ii.	Beta HCH	µg/l	UDECA 508	0.04		< 0.03
iii.	Delta- HCH	µg/l	UDECA 508	0.04		< 0.03
iv.	Alachlor	µg/l	UDECA 508	20		< 0.03
v.	Aldrin / Dieldrin	µg/l	UDECA 508	0.03		< 0.03
vi.	Atrazine	µg/l	UDECA 1657	2		< 0.03
vii.	Butachlor	µg/l	UDECA 508	125		< 0.03
viii.	Chlorpyrifos	µg/l	UDECA 1657	30		< 0.03
ix.	DDT and its Isomers	µg/l	UDECA 508	1		< 0.03
x.	Gamma - HCH (Lindane)	µg/l	UDECA 508	2		< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	UDECA 1657	30		< 0.03
xii.	Endosulphan	µg/l	UDECA 508	0.4		< 0.03
xiii.	Ethion	µg/l	UDECA 1657	3		< 0.03
xiv.	Isoproturon	µg/l	UDECA 1657	9		< 0.03
xv.	Malathion	µg/l	UDECA 1657	190		< 0.03
xvi.	Methyl Parathion	µg/l	UDECA 1657	0.3		< 0.03
xvii.	Monocrotophos	µg/l	UDECA 1657	1		< 0.03
xviii.	Phorate	µg/l	UDECA 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**

**Report on Soil Analysis, Kudag**  
**Date of collection: March-2018**  
**Sample Location:(Old Kudag/Mining Area)**

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/Mining Area
1.	PH (1:5 water extract)	-	7.16 at 25°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	349
3.	Texture	-	Silty Clay
4.	Sand	%	31
5.	Slit	%	43
6.	Clay	%	26
7.	Water Holding Capacity	%	51.29
8.	Bulk Density	g/cc	1.21
9.	Porosity	%	12.58
10.	Exchangeable Calcium (as Ca)	mg/Kg	118.46
11.	Exchangeable Magnesium (as Mg)	mg/Kg	9.17
12.	Exchangeable Manganese (as Mn)	mg/Kg	2.94
13.	Exchangeable Zinc (as Zn)	mg/Kg	0.48
14.	Available Boron (as B)	mg/Kg	0.17
15.	Water Soluble Chloride (as Cl <sup>+</sup> )	mg/Kg	221.54
16.	Water Soluble Sulphate (as SO <sub>4</sub> )	mg/Kg	116.58
17.	Available Potassium (as K)	mg/Kg	71.29
18.	Available Phosphorous (as P)	Kg/hect	1.42
19.	Available Nitrogen (as N)	Kg/hect	121
20.	Cadmium (as Cd)	mg/Kg	ND
21.	Chromium (as Cr)	mg/Kg	ND
22.	Copper (as Cu)	mg/Kg	ND
23.	Lead (as Pb)	mg/Kg	0.16
24.	Total Iron	mg/Kg	4.03
25.	Organic Matter	g/100g	1.21
26.	Organic Carbon	g/100g	0.63
27.	CEC	meq/100g	11.4

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

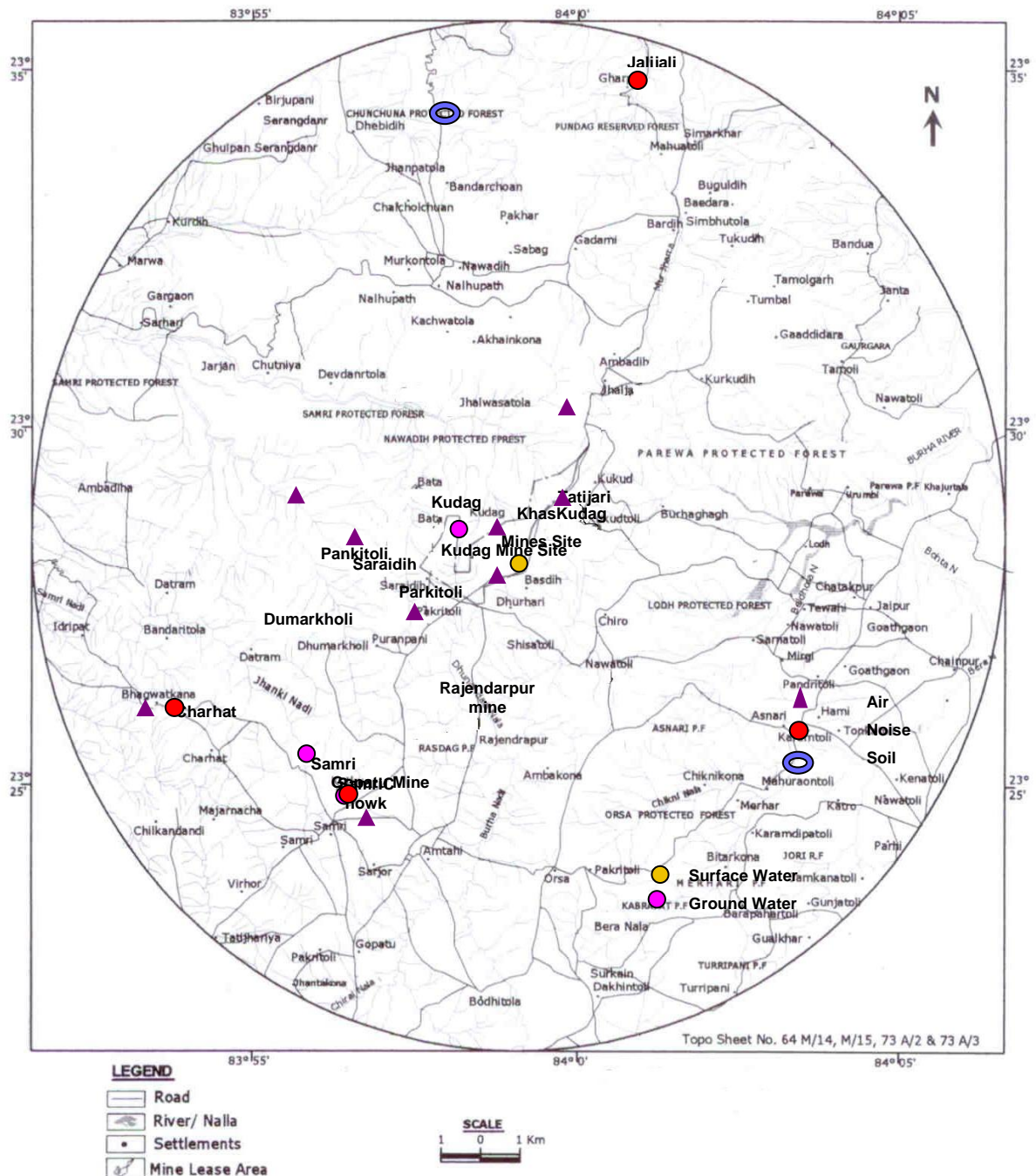




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**Details of Salient  
Features**

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



**Fig 5: Sampling Locations for Water**