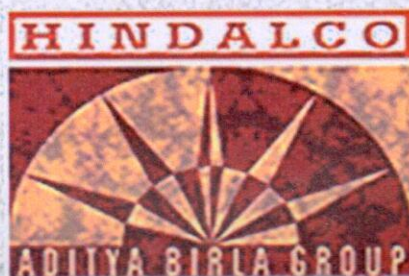


Environmental Status Report  
For  
Kudag Bauxite Mine  
at  
Post & Teh.: Samri, (Kusmi)  
Dist: Balrampur-Ramanujganj (C.G.)

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

Name of Industry



*Rupam...*  
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  
Head Office: 60, Bajiprabhu Nagar, Nagpur-440 033, MS  
Lab. : FP-34, 35, Food Park, MIDC, Butibori, Nagpur – 441122  
Ph.: (0712) 2242077, 9373287475 Fax: (0712) 2242077  
Email: labngp@anacon.in  
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 prerequisite for sustainable development. In line with this requirement, the management of **M/s Hindalco Industries Ltd.** has adopted a corporate responsibility of environment protection.

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

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

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

for **ANACON LABORATORIES PVT. LTD.**

Place : Nagpur

Date : June, 2018



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

Authorized Signatory

## **1.1 Introduction**

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

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

HINDALCO INDUSTRIES LTD., awarded the work to M/s ANACON LABORATORIES PVT. LTD. Nagpur (ALPL) for carrying out Environmental monitoring of parameters for assessing pollution levels and preparation of monthly reports (April-May-June-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 **50** 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**

S.No.	Particulars	Details
1.	Survey of India Toposheet No.	64 M /15
2.	Latitude	23 <sup>o</sup> 26' 02"N to 23 <sup>o</sup> 29' 00"N
3.	Longitude	83 <sup>o</sup> 51' 00"E to 83 <sup>o</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>o</sup> C Annual minimum temperature : 17.7 <sup>o</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  $PM_{2.5}$ , RPM( $PM_{10}$ ),  $SO_2$ ,  $NO_x$  and SPM, RSPM,  $SO_2$ ,  $NO_x$ , 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 April-May-June-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  $PM_{2.5}$ , RPM ( $PM_{10}$ ),  $SO_2$ ,  $NO_x$  and SPM, RSPM,  $SO_2$ ,  $NO_x$ , Pb, Hg, As and Cr from April-May-June-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.

## 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**

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.	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 April-May-June-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.

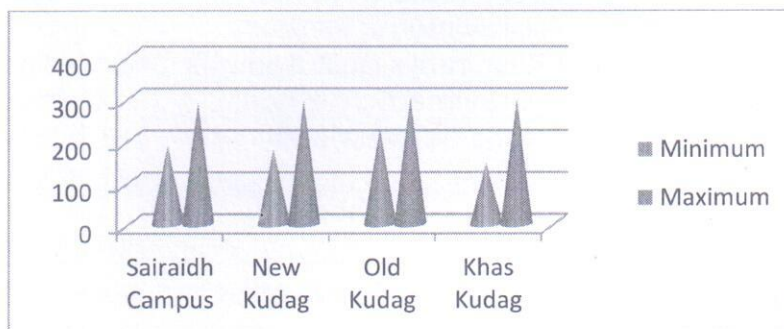
#### 1.6.1 Presentation of Results.

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

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 146 $\mu\text{g}/\text{m}^3$  and 303 $\mu\text{g}/\text{m}^3$  respectively. The average concentrations were ranged between 203 to 281 $\mu\text{g}/\text{m}^3$ , and 98<sup>th</sup> percentile values ranged between 242 to 302 $\mu\text{g}/\text{m}^3$  in the study area (**Table 6**).

#### Graphical Presentation of Fugitive Emission Monitoring

### SPM



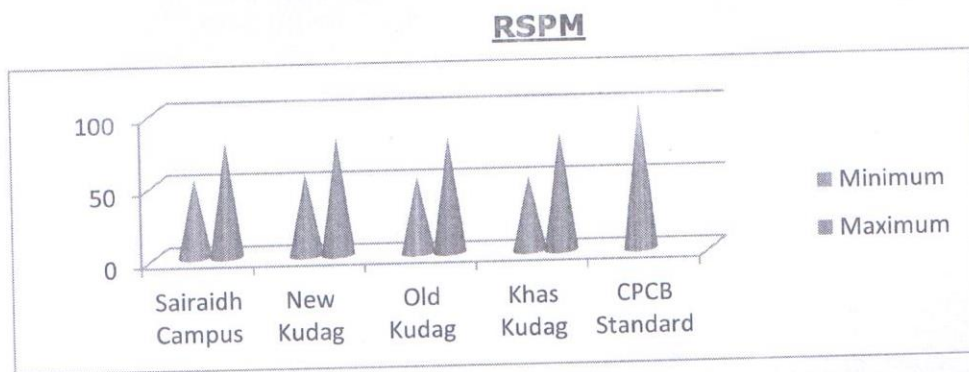




### Respirable Suspended Particulate Matter -RSPM

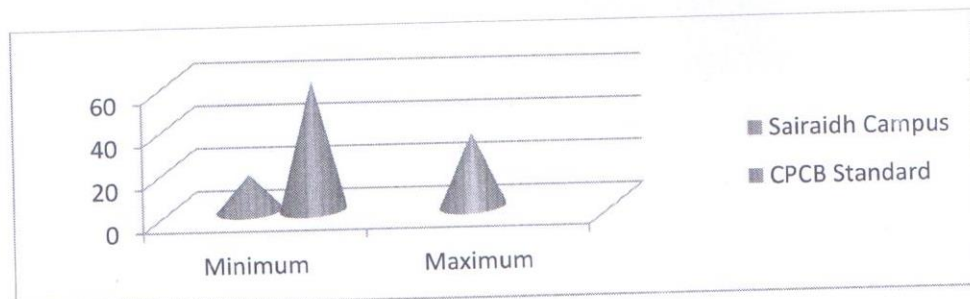
The minimum and maximum concentrations for RSPM were recorded as  $51\mu\text{g}/\text{m}^3$  and  $81\mu\text{g}/\text{m}^3$  respectively. The average values were observed to be in the range of  $54$  to  $76\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between  $56$  to  $81\mu\text{g}/\text{m}^3$  in the study area (Table 7).

### Graphical Presentation of Fugitive Emission Monitoring



### Particulate Matter - $\text{PM}_{2.5}$

The minimum and maximum values of  $\text{PM}_{2.5}$  concentrations varied between  $17$  to  $34\mu\text{g}/\text{m}^3$  respectively. The average values range between  $17$  to  $26\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values varied between  $23$  to  $34\mu\text{g}/\text{m}^3$  (Table 8).

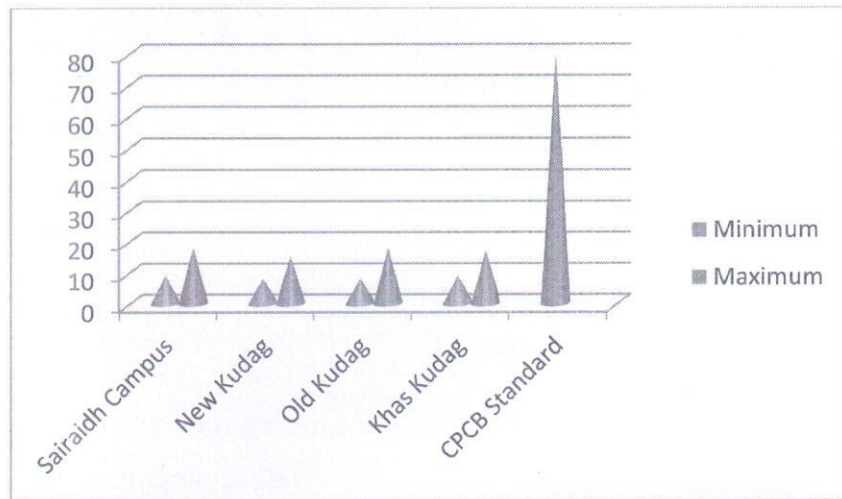


**Sulphur Dioxide (SO<sub>2</sub>)**

The minimum and maximum SO<sub>2</sub> concentrations were recorded as 8µg/m<sup>3</sup> and 18µg/m<sup>3</sup> respectively. The average values were observed to be in the range of 11 to 15µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 12 to 18µg/m<sup>3</sup> (Table 9).

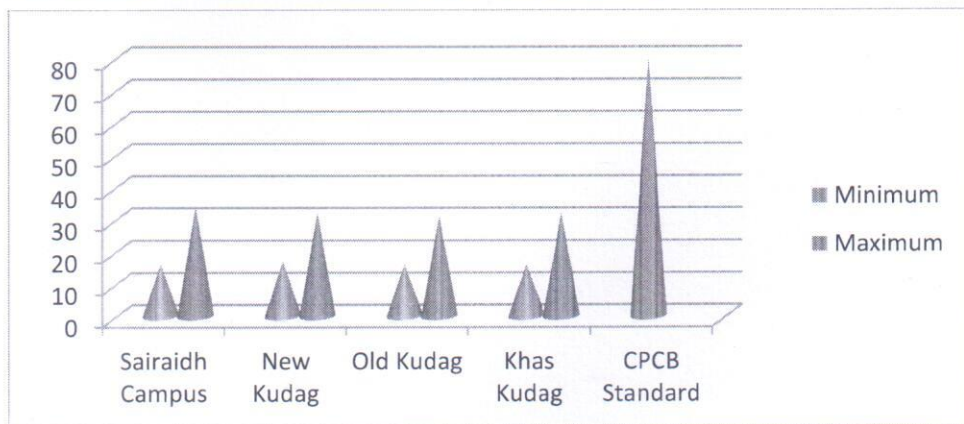
**Graphical Presentation Of Fugitive Emission Monitoring**

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



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

The minimum and maximum NO<sub>x</sub> concentrations were recorded as 16µg/m<sup>3</sup> and 34µg/m<sup>3</sup>. The average concentrations were ranged between 17 to 28µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 18 to 34µg/m<sup>3</sup> (Table 10).





### **Lead (Pb)**

The minimum and maximum Lead detected between 0.017 to 0.043 $\mu\text{g}/\text{m}^3$  respectively. The average Lead detected between 0.020 to 0.035 $\mu\text{g}/\text{m}^3$  & 98th percentile values varied between 0.021 to 0.043 $\mu\text{g}/\text{m}^3$  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)**.

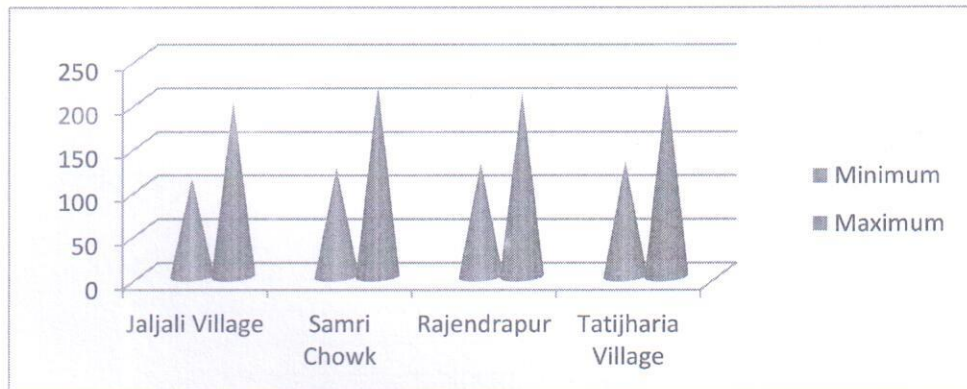
### **1.7.1 Presentation of Results.**

The summary of Ambient Air Quality monitoring results for the month of April-May-June-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 112 to 218 $\mu\text{g}/\text{m}^3$  respectively during study period at all the 4 locations. The average values ranged between 129 to 200 $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 145 to 232 $\mu\text{g}/\text{m}^3$  in the study area.

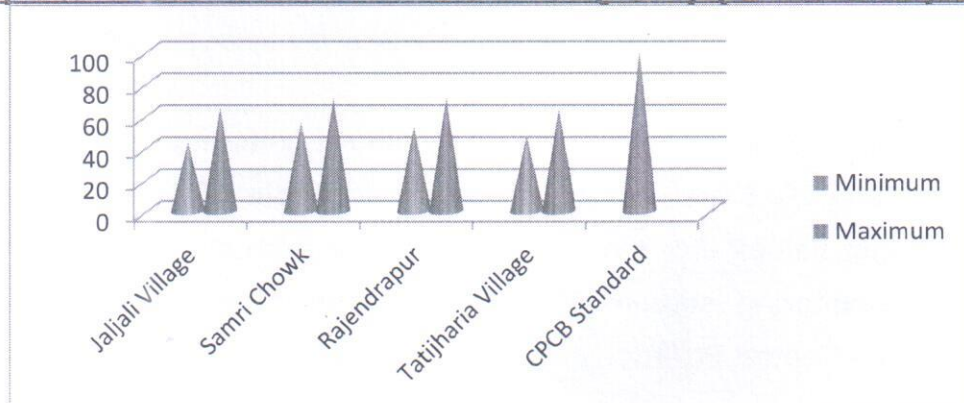
**Graphical Presentation of Ambient Air Quality (Buffer Zone)**



**Particulate Matter-RSPM**

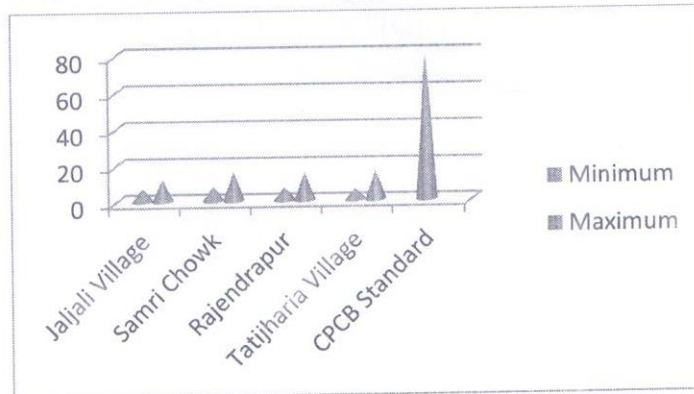
The minimum and maximum values of RSPM varied between 43 to 71 $\mu\text{g}/\text{m}^3$  respectively (**Table 7**). The average values varied between 53 to 69 $\mu\text{g}/\text{m}^3$ . The 98<sup>th</sup> percentile values varied between 52 to 71 $\mu\text{g}/\text{m}^3$  in the mining area. The overall 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 16µg/m<sup>3</sup> respectively. The average values range between 8 to 14µg/m<sup>3</sup> and 98th percentile values varied between 9 to 16µg/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 16 to 34µg/m<sup>3</sup> respectively. The average values range between 17 to 28µg/m<sup>3</sup> and 98th percentile values varied between 18 to 34µg/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 April-May-June-2018 in Old Kudag/Mining Area and Khas Kudag village. The dust fall rate was observed to be 21.5 and 17.6MT/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

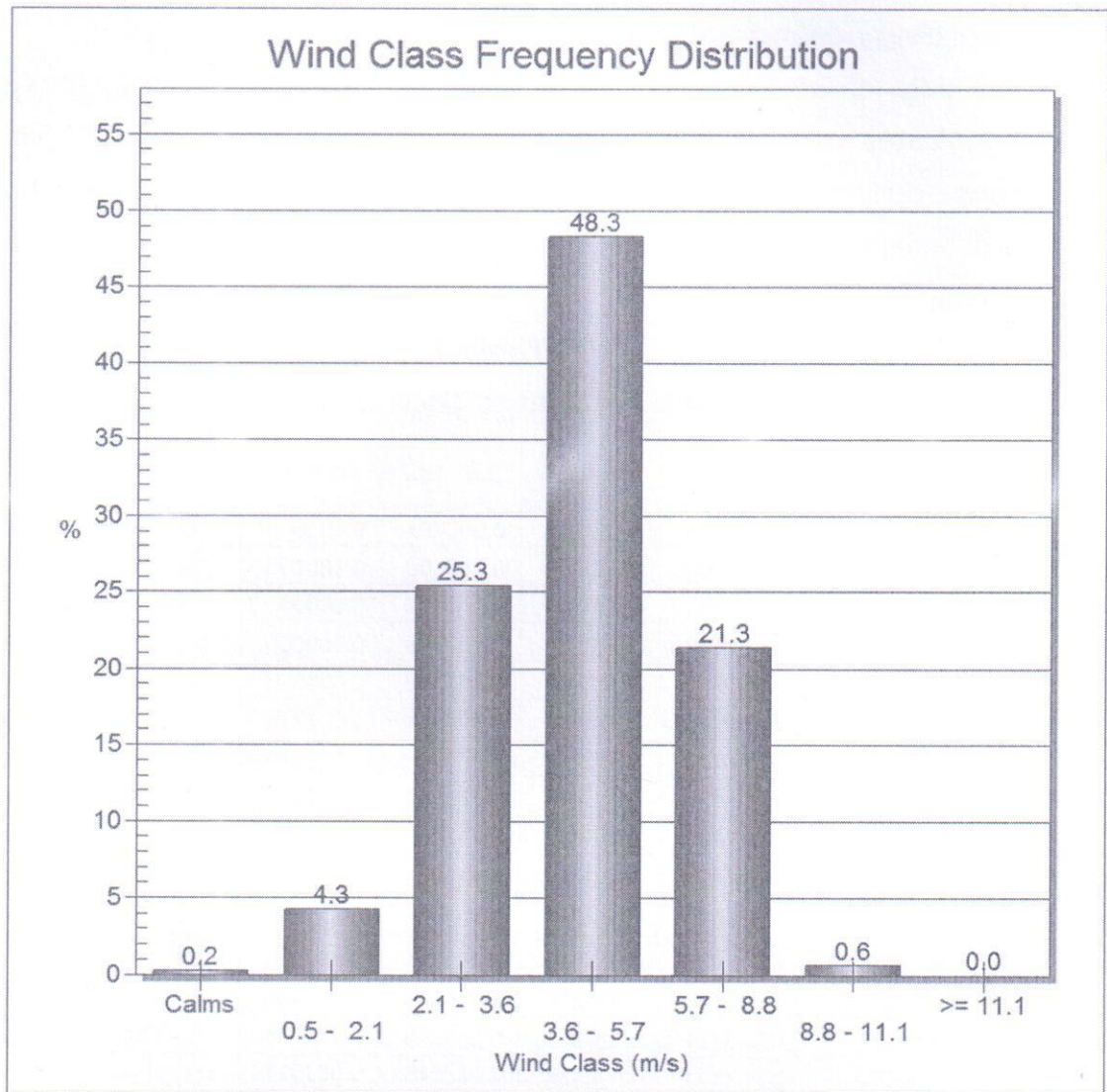
The data of wind pattern collected during the study period (April-May-June-2018) indicates that the wind was blowing predominantly from (WSW and SW) directions, during study period, for 0.22 % wind was found to be calm. The graphical illustration and wind rose diagram is presented in Figures-1 & 2 respectively.

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

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

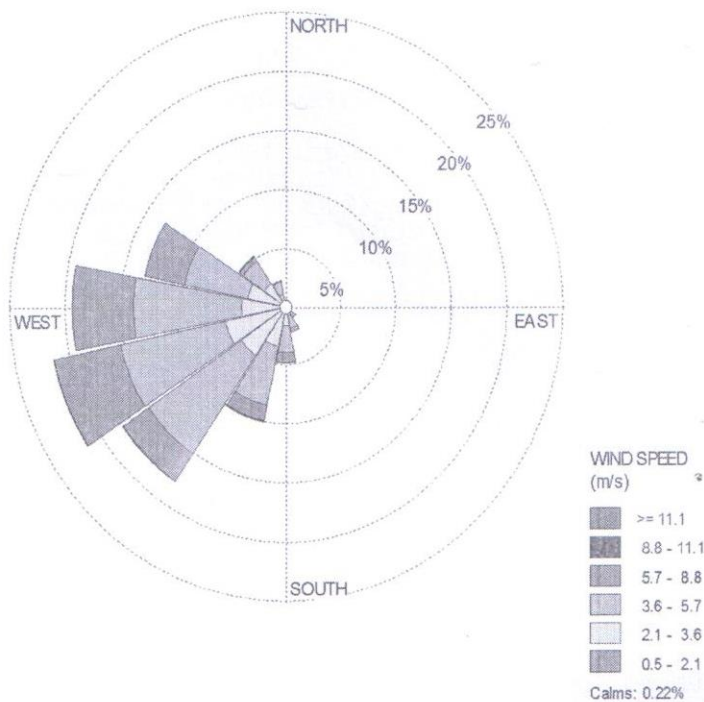
### SUMMARY OF WIND PATTERN

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



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





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

### 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



**Hindalco Industries Limited**  
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**Details of Salient**  
**Features**

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.



**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>	April-2018	187	248	218	218	247
	May-2018	225	291	258	258	290
	June-2018	215	243	229	229	242
<b>New Kudag/Nr. Weigh Bridge</b>	April-2018	194	254	224	224	253
	May-2018	218	295	257	257	293
	June-2018	178	264	221	221	262
<b>Old Kudag/Mining Area</b>	April-2018	231	296	264	264	295
	May-2018	258	303	281	281	302
	June-2018	228	271	250	250	270
<b>Khas Kudag</b>	April-2018	218	252	235	235	251
	May-2018	229	297	263	263	296
	June-2018	146	259	203	203	257
<b>CPCB Standard</b>				---		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	April-2018	125	176	151	151	175
	May-2018	147	199	173	173	198
	June-2018	112	146	129	129	145
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	April-2018	139	191	165	165	190
	May-2018	170	218	194	194	217
	June-2018	124	163	144	144	162
<b>Rajendrapur</b>	April-2018	140	209	175	175	208
	May-2018	152	198	175	175	197
	June-2018	129	157	143	143	156
<b>Tatijharia Village</b>	April-2018	155	222	189	189	221
	May-2018	167	233	200	200	232
	June-2018	131	182	157	157	181
<b>CPCB Standard</b>				---		

**Conclusion-A:-**

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of Apr-May-June-2018 Avg. of SPM is  $235 \mu\text{g}/\text{m}^3$ .
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Apr-May-June -2018 Avg. of SPM is  $234 \mu\text{g}/\text{m}^3$ .
- 3) **Old Kudag/Mining Lease Area Core Zone: -** For the Months of Apr-May-June -2018 Avg. of SPM is  $265 \mu\text{g}/\text{m}^3$ .
- 4) **Khas Kudag Lease Area Core Zone: -** For the Months of Apr-May-June -2018 Avg. of SPM is  $234 \mu\text{g}/\text{m}^3$ .

- The Average Concentration of SPM within the core zone of Kudag Lease is  $242 \mu\text{g}/\text{m}^3$ .

**Conclusion-B:-**

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Apr-May-June -2018 Avg. of SPM is  $151 \mu\text{g}/\text{m}^3$ .
- 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Apr-May-June -2018 Avg. of SPM is  $168 \mu\text{g}/\text{m}^3$ .
- 3) **Rajendrapur Lease Area Buffer Zone :-** For the Months of Apr-May-June -2018 Avg. of SPM is  $164 \mu\text{g}/\text{m}^3$ .
- 4) **Tatijharia Lease Area Buffer Zone :-** For the Months of Apr-May-June -2018 Avg. of SPM is  $182 \mu\text{g}/\text{m}^3$ .

- The Average Concentration of SPM within the Buffer Zone of Kudag Lease is  $166 \mu\text{g}/\text{m}^3$



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

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

**2.1.1 Presentation of Results.**

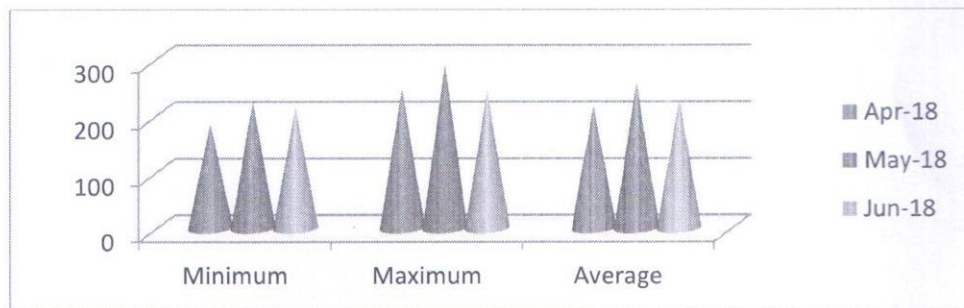
The summary of Statistical Analysis of SPM results for the month of April-2018 to June-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Sairaidh Campus**

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as 187µg/m<sup>3</sup> and 248µg/m<sup>3</sup> respectively and average concentration of 218µg/m<sup>3</sup>.

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as 225µg/m<sup>3</sup> and 291µg/m<sup>3</sup> respectively and average concentration of 258µg/m<sup>3</sup>.

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as 215µg/m<sup>3</sup> and 243µg/m<sup>3</sup> respectively and average concentration of 229µg/m<sup>3</sup>.



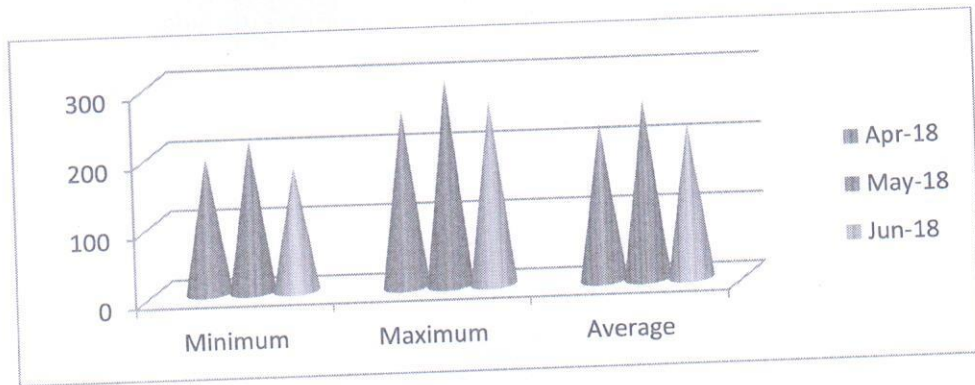
**Graph :- Sairaidh Campus**

**New Kudag/Nr.Weigh Bridge**

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $194\mu\text{g}/\text{m}^3$  and  $254\mu\text{g}/\text{m}^3$  respectively and average concentration of  $224\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $218\mu\text{g}/\text{m}^3$  and  $295\mu\text{g}/\text{m}^3$  respectively and average concentration of  $257\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $178\mu\text{g}/\text{m}^3$  and  $264\mu\text{g}/\text{m}^3$  respectively and average concentration of  $221\mu\text{g}/\text{m}^3$ .



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

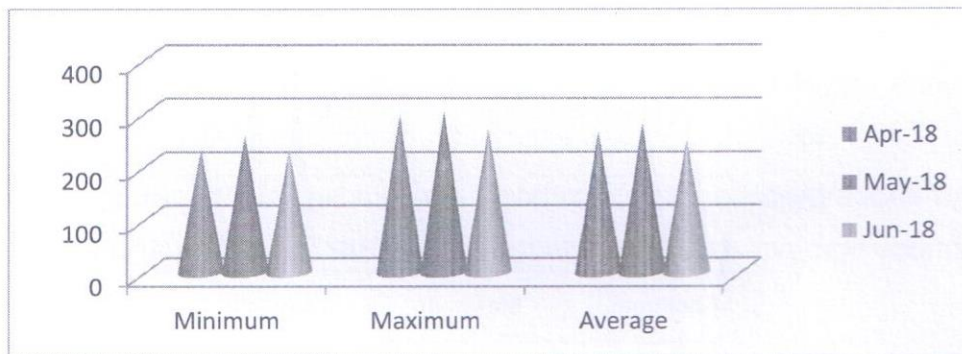


### Old Kudag/Mining Area

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $231\mu\text{g}/\text{m}^3$  and  $296\mu\text{g}/\text{m}^3$  respectively and average concentration of  $264\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $258\mu\text{g}/\text{m}^3$  and  $303\mu\text{g}/\text{m}^3$  respectively and average concentration of  $281\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $228\mu\text{g}/\text{m}^3$  and  $271\mu\text{g}/\text{m}^3$  respectively and average concentration of  $250\mu\text{g}/\text{m}^3$ .



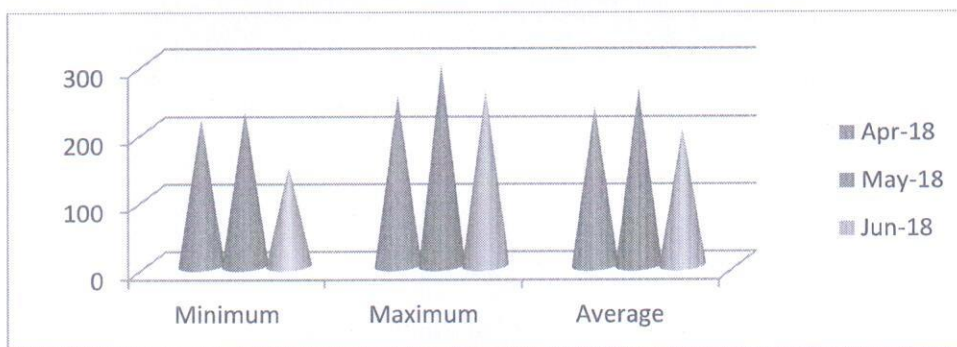
**Graph: - Old Kudag/Mining Area**

**Khas Kudag**

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as 218 $\mu\text{g}/\text{m}^3$  and 252 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 235 $\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as 229 $\mu\text{g}/\text{m}^3$  and 297 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 263 $\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as 146 $\mu\text{g}/\text{m}^3$  and 259 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 203 $\mu\text{g}/\text{m}^3$ .



**Graph: - Khas Kudag**





## 2.2 Fugitive Emission (Buffer Zone):-

### 2.2.1 Presentation of Results.

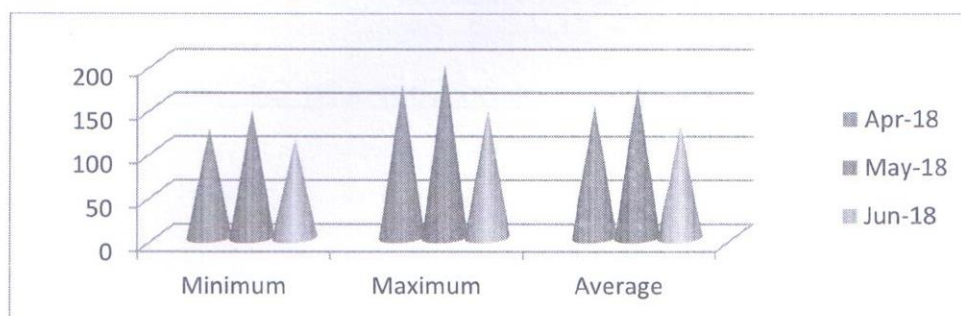
The summary of Statistical Analysis of SPM results for the month of April-2018 to June-2018 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Jaljali Village

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $125\mu\text{g}/\text{m}^3$  and  $176\mu\text{g}/\text{m}^3$  respectively and average concentration of  $151\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $147\mu\text{g}/\text{m}^3$  and  $199\mu\text{g}/\text{m}^3$  respectively and average concentration of  $173\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $112\mu\text{g}/\text{m}^3$  and  $146\mu\text{g}/\text{m}^3$  respectively and average concentration of  $129\mu\text{g}/\text{m}^3$ .



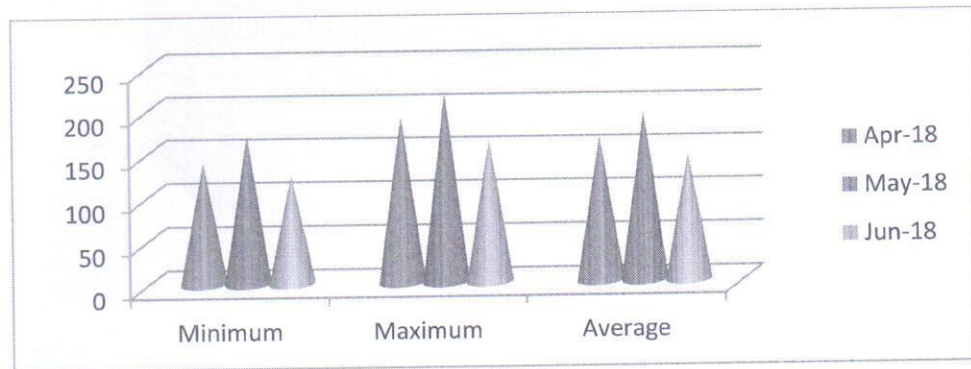
**Graph: - Jaljali Village**

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

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $139\mu\text{g}/\text{m}^3$  and  $191\mu\text{g}/\text{m}^3$  respectively and average concentration of  $165\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $170\mu\text{g}/\text{m}^3$  and  $218\mu\text{g}/\text{m}^3$  respectively and average concentration of  $194\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $124\mu\text{g}/\text{m}^3$  and  $163\mu\text{g}/\text{m}^3$  respectively and average concentration of  $144\mu\text{g}/\text{m}^3$ .



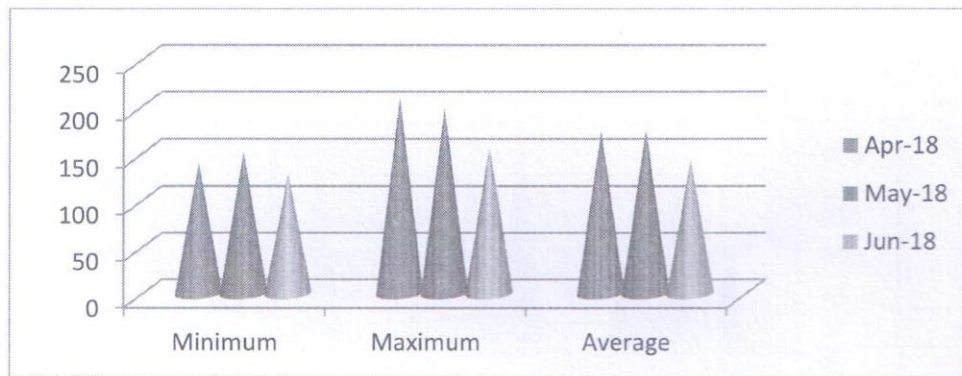
**Graph:- Samri Chowk/Nr.Old Weigh Bridge**

**Rajendrapur**

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $140\mu\text{g}/\text{m}^3$  and  $209\mu\text{g}/\text{m}^3$  respectively and average concentration of  $175\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $152\mu\text{g}/\text{m}^3$  and  $198\mu\text{g}/\text{m}^3$  respectively and average concentration of  $175\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $129\mu\text{g}/\text{m}^3$  and  $157\mu\text{g}/\text{m}^3$  respectively and average concentration of  $143\mu\text{g}/\text{m}^3$ .

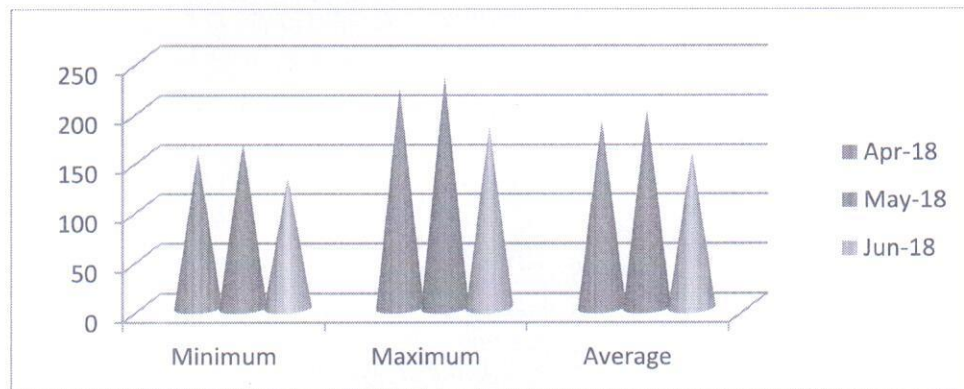
**Graph:- Rajendrapur**

**Tatijharia Village**

For the month of April-2018 the minimum and maximum concentrations for SPM were recorded as  $155\mu\text{g}/\text{m}^3$  and  $222\mu\text{g}/\text{m}^3$  respectively and average concentration of  $189\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for SPM were recorded as  $167\mu\text{g}/\text{m}^3$  and  $233\mu\text{g}/\text{m}^3$  respectively and average concentration of  $200\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for SPM were recorded as  $131\mu\text{g}/\text{m}^3$  and  $182\mu\text{g}/\text{m}^3$  respectively and average concentration of  $157\mu\text{g}/\text{m}^3$ .



**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>						
Sairaidh Campus	April-2018	65	71	68	68	71
	May-2018	72	79	76	76	79
	June-2018	54	63	59	59	63
New Kudag/Nr. Weigh Bridge	April-2018	70	81	76	76	81
	May-2018	73	79	76	76	79
	June-2018	56	68	62	62	68
Old Kudag/Mining Area	April-2018	64	73	69	69	73
	May-2018	69	79	74	74	79
	June-2018	52	67	60	60	67
Khas Kudag	April-2018	60	81	71	71	81
	May-2018	67	70	69	69	70
	June-2018	51	56	54	54	56
<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>						
Jaljali Village	April-2018	52	55	54	54	55
	May-2018	57	65	61	61	65
	June-2018	43	52	48	48	52
Samri Chowk/ Nr.Old Weigh Bridge	April-2018	61	67	64	64	67
	May-2018	65	71	68	68	71
	June-2018	56	62	59	59	62
Rajendrapur	April-2018	60	64	62	62	64
	May-2018	66	71	69	69	71
	June-2018	53	61	57	57	61
Tatijharia Village	April-2018	55	61	58	58	61
	May-2018	57	64	61	61	64
	June-2018	47	58	53	53	58
<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 Apr-May-June-2018 Avg. of RSPM is  $68\mu\text{g}/\text{m}^3$ .
  - 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Apr-May-June-2018 Avg. of RSPM is  $71\mu\text{g}/\text{m}^3$ .
  - 3) **Old Kudag/Mining Lease Area Core Zone: -** For the Months of Apr-May-June-2018 Avg. of RSPM is  $68\mu\text{g}/\text{m}^3$ .
  - 4) **Khas Kudag Lease Area Core Zone: -** For the Months of Apr-May-June-2018 Avg. of RSPM is  $65\mu\text{g}/\text{m}^3$ .
- The Average Concentration of RSPM within the core zone of Kudag Lease is  $68\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion-B:-**

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Apr-May-June-2018 Avg. of RSPM is  $54\mu\text{g}/\text{m}^3$ .
  - 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Apr-May-June-2018 Avg. of RSPM is  $64\mu\text{g}/\text{m}^3$ .
  - 3) **Rajendrapur Lease Area Buffer Zone: -** For the Months of Apr-May-June-2018 Avg. of RSPM is  $63\mu\text{g}/\text{m}^3$ .
  - 4) **Tatijharia Village Lease Area Buffer Zone: -** For the Months of Apr-May-June-2018 Avg. of RSPM is  $57\mu\text{g}/\text{m}^3$ .
- The Average Concentration of RSPM within the Buffer Zone of Kudag Lease is  $60\mu\text{g}/\text{m}^3$  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.**

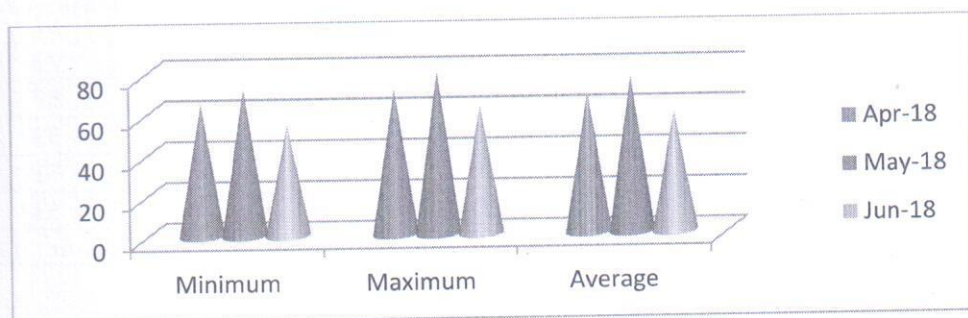
The summary of Statistical Analysis of RSPM results for the month of April-2018 to June-2018 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Sairaidh Campus**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as 65 $\mu\text{g}/\text{m}^3$  and 71 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 68 $\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for RSPM were recorded as 72 $\mu\text{g}/\text{m}^3$  and 79 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 76 $\mu\text{g}/\text{m}^3$ .

For the month of June-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 :- Sairaidh Campus**

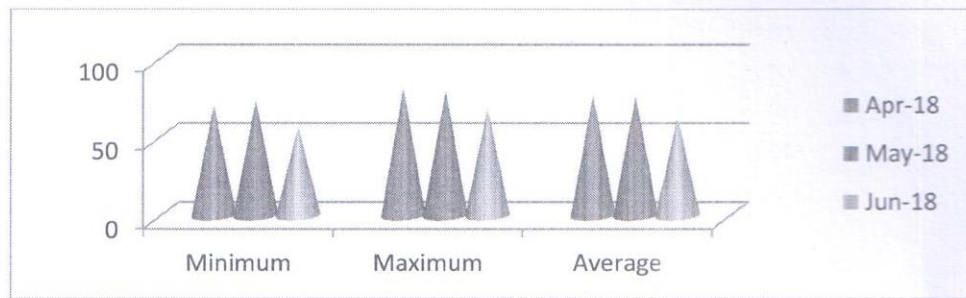


**New Kudag/Nr.Weigh Bridge**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $70\mu\text{g}/\text{m}^3$  and  $81\mu\text{g}/\text{m}^3$  respectively and average concentration of  $76\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $73\mu\text{g}/\text{m}^3$  and  $79\mu\text{g}/\text{m}^3$  respectively and average concentration of  $76\mu\text{g}/\text{m}^3$ .

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



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

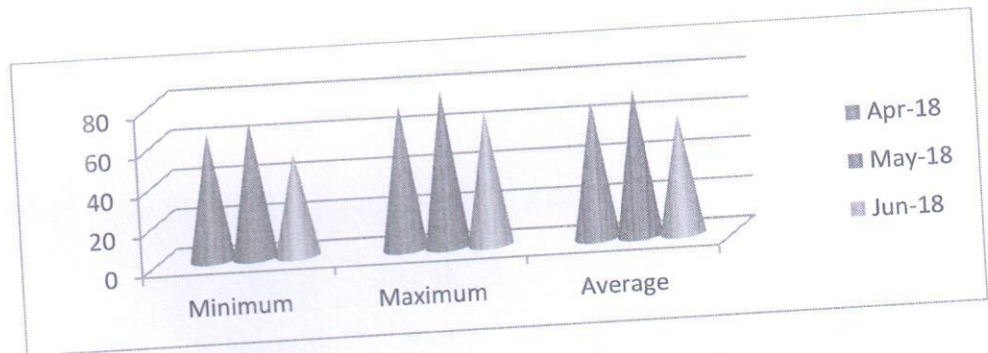


**Old Kudag/Mining Area**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $64\mu\text{g}/\text{m}^3$  and  $73\mu\text{g}/\text{m}^3$  respectively and average concentration of  $69\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $69\mu\text{g}/\text{m}^3$  and  $79\mu\text{g}/\text{m}^3$  respectively and average concentration of  $74\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for RSPM were recorded as  $52\mu\text{g}/\text{m}^3$  and  $67\mu\text{g}/\text{m}^3$  respectively and average concentration of  $60\mu\text{g}/\text{m}^3$ .



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



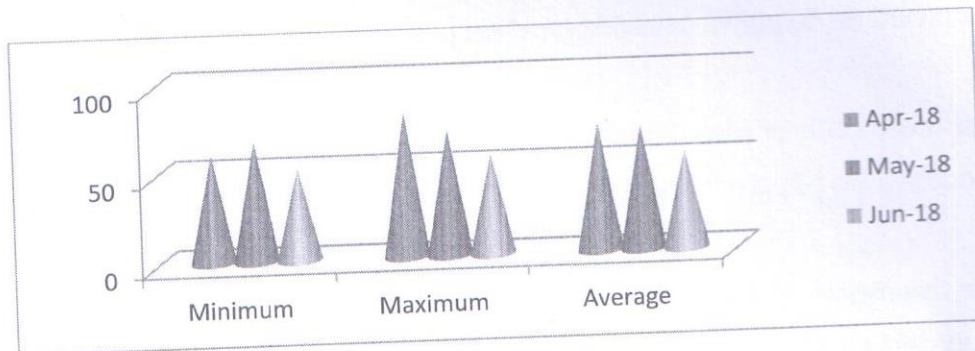


**Khas Kudag**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $60\mu\text{g}/\text{m}^3$  and  $81\mu\text{g}/\text{m}^3$  respectively and average concentration of  $71\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $67\mu\text{g}/\text{m}^3$  and  $70\mu\text{g}/\text{m}^3$  respectively and average concentration of  $69\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for RSPM were recorded as  $51\mu\text{g}/\text{m}^3$  and  $56\mu\text{g}/\text{m}^3$  respectively and average concentration of  $54\mu\text{g}/\text{m}^3$ .



**Graph: - Khas Kudag**

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

**2.4.1 Presentation of Results.**

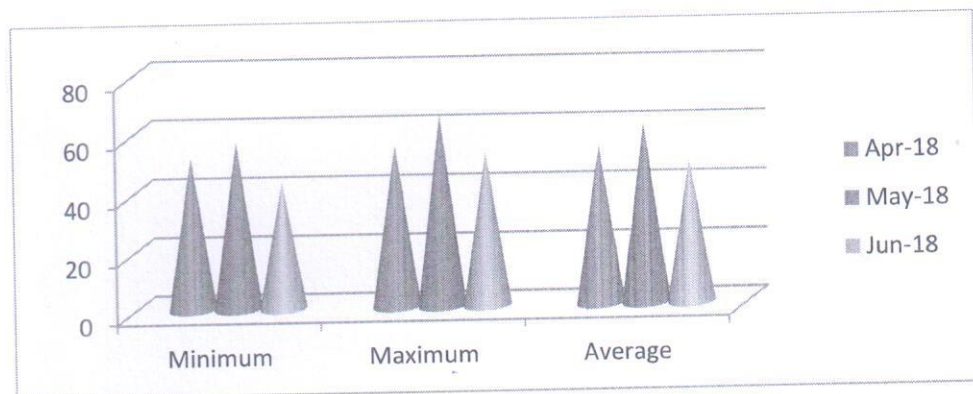
The summary of Statistical Analysis of RSPM results for the month of April-2018 to June 2018 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Jaljali Village**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as 52 $\mu\text{g}/\text{m}^3$  and 55 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 54 $\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for RSPM were recorded as 57 $\mu\text{g}/\text{m}^3$  and 65 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 61 $\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for RSPM were recorded as 43 $\mu\text{g}/\text{m}^3$  and 52 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 48 $\mu\text{g}/\text{m}^3$ .



**Graph: - Jaljali Village**

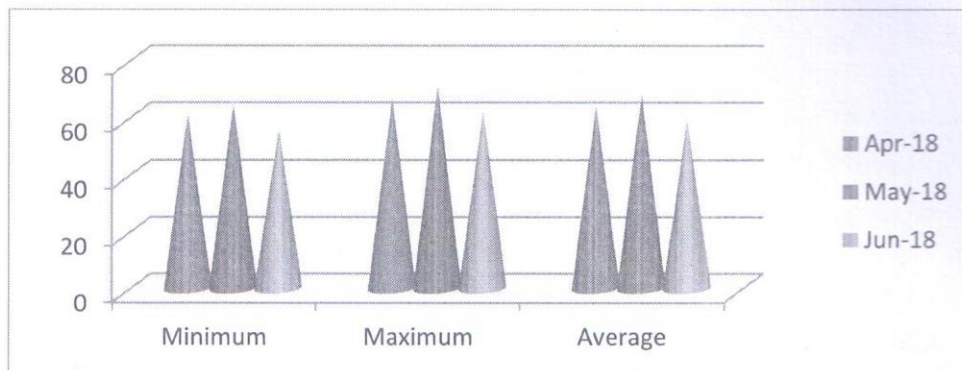


**Samri Chowk/Nr.Old Weigh Bridge**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $61\mu\text{g}/\text{m}^3$  and  $67\mu\text{g}/\text{m}^3$  respectively and average concentration of  $64\mu\text{g}/\text{m}^3$ .

For the month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $65\mu\text{g}/\text{m}^3$  and  $71\mu\text{g}/\text{m}^3$  respectively and average concentration of  $68\mu\text{g}/\text{m}^3$ .

For the month of June-2018 the minimum and maximum concentrations for RSPM were recorded as  $56\mu\text{g}/\text{m}^3$  and  $62\mu\text{g}/\text{m}^3$  respectively and average concentration of  $59\mu\text{g}/\text{m}^3$ .



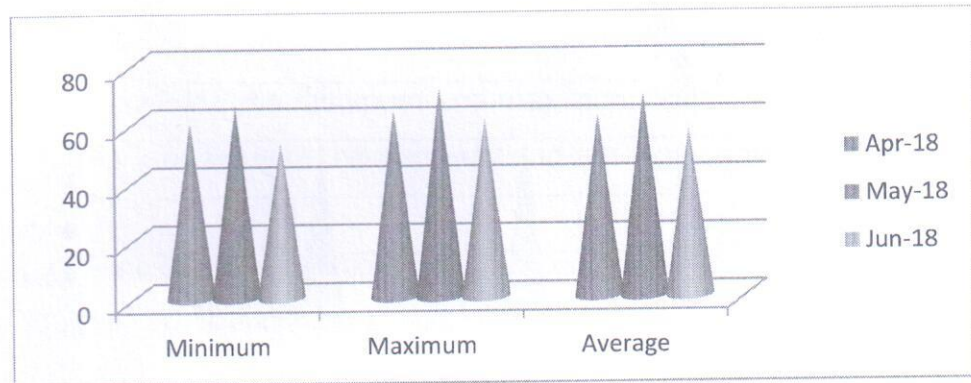
**Graph: - Samri Chowk/Nr.Old Weigh Bridge**

**Rajendrapur**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $60\mu\text{g}/\text{m}^3$  and  $64\mu\text{g}/\text{m}^3$  respectively and average concentration of  $62\mu\text{g}/\text{m}^3$

For the month of May-2018 the minimum and maximum concentrations for RSPM were recorded as  $66\mu\text{g}/\text{m}^3$  and  $71\mu\text{g}/\text{m}^3$  respectively and average concentration of  $69\mu\text{g}/\text{m}^3$

For the month of June-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  $57\mu\text{g}/\text{m}^3$



**Graph:- Rajendrapur**

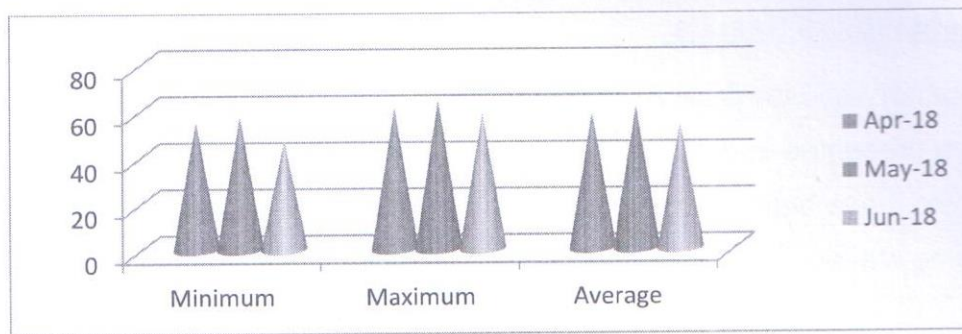


**Tatijharia Village**

For the month of April-2018 the minimum and maximum concentrations for RSPM were recorded as  $55\mu\text{g}/\text{m}^3$  and  $61\mu\text{g}/\text{m}^3$  respectively and average concentration of  $58\mu\text{g}/\text{m}^3$ .

For the month of May-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 June-2018 the minimum and maximum concentrations for RSPM were recorded as  $47\mu\text{g}/\text{m}^3$  and  $58\mu\text{g}/\text{m}^3$  respectively and average concentration of  $53\mu\text{g}/\text{m}^3$ .



**Graph:- Tatijharia Village**



**Table 8**

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

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%
<b>Sairaidh Campus</b>	April-2018	24	31	24	31	31
	May-2018	26	34	26	34	34
	June-2018	17	23	17	23	23
<b>CPCB Standard</b>				<b>60 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>		

**Conclusion :-**

The Average Concentration of PM<sub>2.5</sub> within Kudag Lease during this period (Apr-May-June-2018) is 22 $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

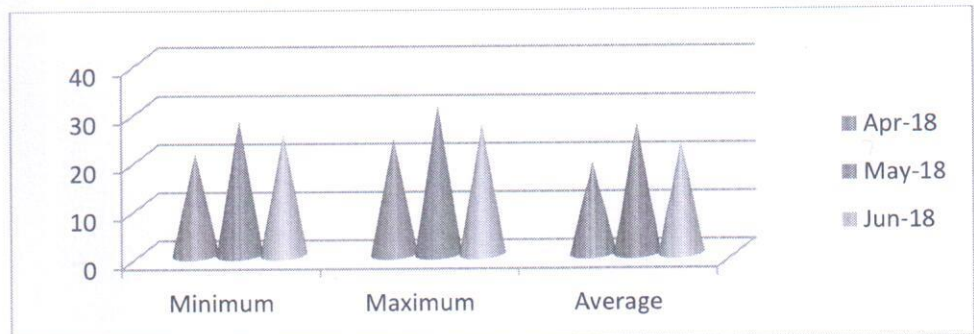
**Monthwise Summary of Statistical Analysis of PM<sub>2.5</sub>**

**2.5 Presentation of Results.**

The summary of Statistical Analysis of PM<sub>2.5</sub> results for the month of April-2018 to June 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 April-2018 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 24 $\mu\text{g}/\text{m}^3$  and 31 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 24 $\mu\text{g}/\text{m}^3$ . For the month of May-2018 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 26 $\mu\text{g}/\text{m}^3$  and 34 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 26 $\mu\text{g}/\text{m}^3$ . For the month of June-2018 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 17 $\mu\text{g}/\text{m}^3$  and 23 $\mu\text{g}/\text{m}^3$  respectively and average concentration of 17 $\mu\text{g}/\text{m}^3$ .





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

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
Sairaidh Campus	April-2018	11	17	14	14	17
	May-2018	12	18	15	15	18
	June-2018	9	13	11	11	13
New Kudag/Nr. Weigh Bridge	April-2018	12	15	14	14	15
	May-2018	10	13	12	12	13
	June-2018	8	14	11	11	14
Old Kudag/Mining Area	April-2018	10	15	13	13	15
	May-2018	12	18	15	15	18
	June-2018	8	12	10 <sup>a</sup>	10	12
Khas Kudag	April-2018	12	17	15	15	17
	May-2018	10	15	13	13	15
	June-2018	9	13	11	11	13
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
Jaljali Village	April-2018	10	12	11	11	12
	May-2018	9	11	10	10	11
	June-2018	7	9	8	8	9
Samri Chowk/ Nr.Old Weigh Bridge	April-2018	11	15	13	13	15
	May-2018	12	16	14	14	16
	June-2018	8	11	10	10	11
Rajendrapur	April-2018	10	12	11	11	12
	May-2018	11	15	13	13	15
	June-2018	7	11	9	9	11
Tatijharia Village	April-2018	11	16	14	14	16
	May-2018	9	12	11	11	12
	June-2018	6	9	8	8	9
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

**Conclusion-A:-**

- Sairaidh Campus Lease Area Core Zone :-** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 13 $\mu\text{g}/\text{m}^3$ .
- New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 12 $\mu\text{g}/\text{m}^3$ .
- Old Kudag/Mining Lease Area Core Zone: -** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 13 $\mu\text{g}/\text{m}^3$ .
- Khas Kudag Lease Area Core Zone: -** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 13 $\mu\text{g}/\text{m}^3$ .

The Average Concentration of SO<sub>2</sub> within the core zone of Kudag Lease is 13 $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion-B:-**

- Jaljali Village Lease Area Buffer Zone :-** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 10  $\mu\text{g}/\text{m}^3$ .
  - Samri Chowk Lease Area Buffer Zone :-** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 12 $\mu\text{g}/\text{m}^3$ .
  - Rajendrapur Lease Area Buffer Zone: -** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 11 $\mu\text{g}/\text{m}^3$ .
  - Tatijharia Village Lease Area Buffer Zone: -** For the Months of Apr-May-June-2018 Avg. of SO<sub>2</sub> is 11 $\mu\text{g}/\text{m}^3$ .
- The Average Concentration of SO<sub>2</sub> within the Buffer Zone of Kudag Lease is 11 $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

## 2.6 Fugitive Emission (Core Zone):-

### 2.6.1 Presentation of Results.

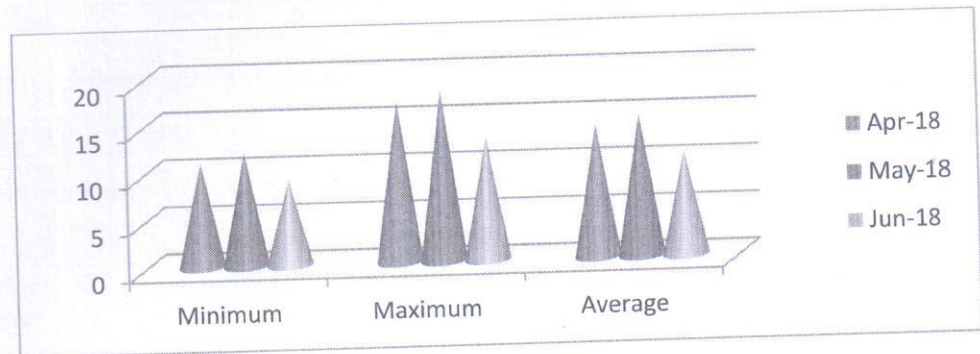
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of April-2018 to June-2018 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Sairaidh Campus

For the month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 11µg/m<sup>3</sup> and 17µg/m<sup>3</sup> respectively and average concentration of 14µg/m<sup>3</sup>.

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



**Graph :- Sairaidh Campus**



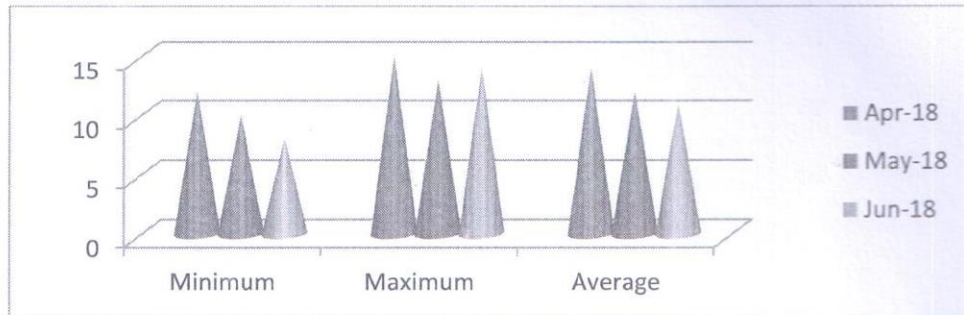


**New Kudag/Nr.Weigh Bridge**

For the month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 12µg/m<sup>3</sup> and 15µg/m<sup>3</sup> respectively and average concentration of 14µg/m<sup>3</sup>.

For the month of May-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 10µg/m<sup>3</sup> and 13µg/m<sup>3</sup> respectively and average concentration of 12µg/m<sup>3</sup>.

For the month of June-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8µg/m<sup>3</sup> and 14µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.



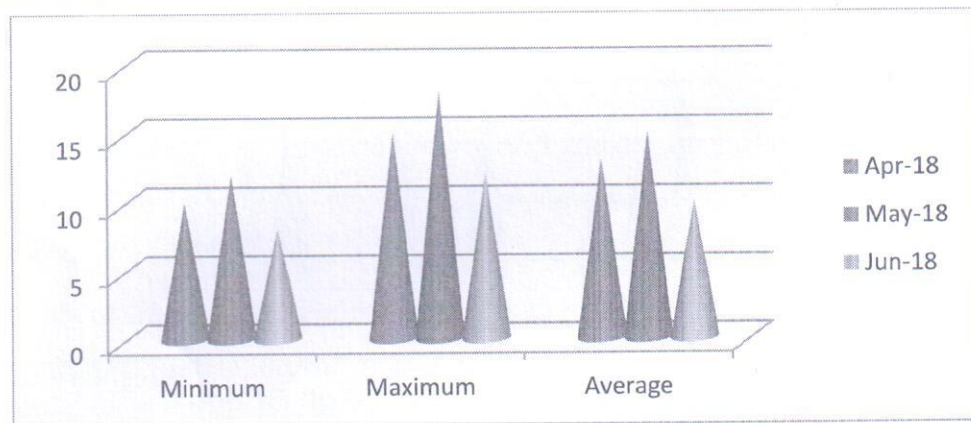
**Graph: - New Kudag/Nr.Weigh Bridge**

**Old Kudag/Mining Area**

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



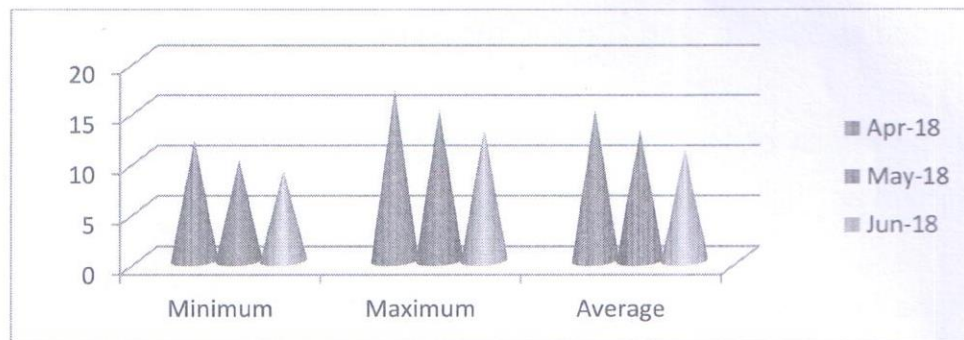
**Graph: - Old Kudag/Mining Area**

**Khas Kudag**

SO<sub>2</sub> were recorded as 12µg/m<sup>3</sup> and 17µg/m<sup>3</sup> respectively and average concentration of 15µg/m<sup>3</sup>.

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>.

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>.

**Graph: - Khas Kudag**

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

**2.7.1 Presentation of Results.**

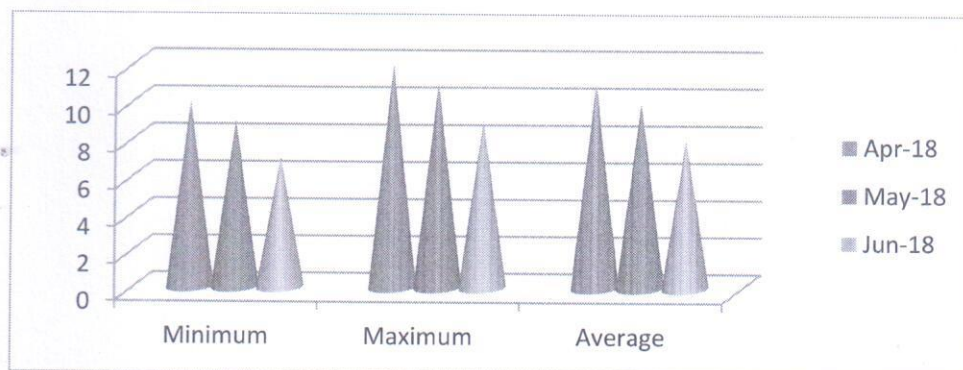
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of April-2018 to June-2018 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Jaljali Village**

For the month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 10µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.

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

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



**Graph: - Jaljali Village**

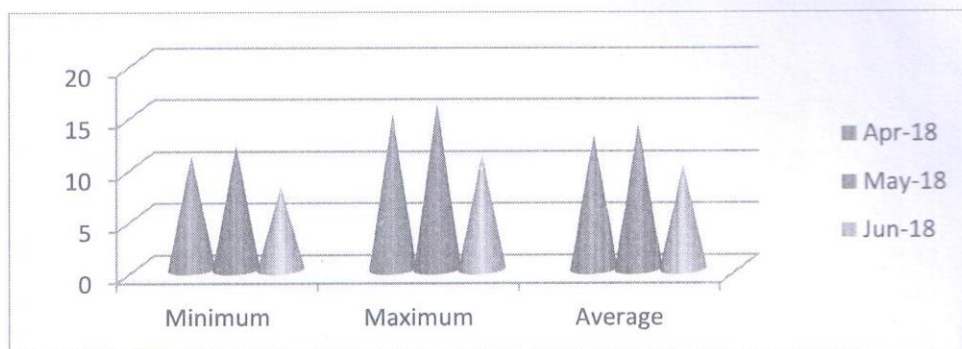


**Samri Chowk/Nr.Old Weigh Bridge**

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



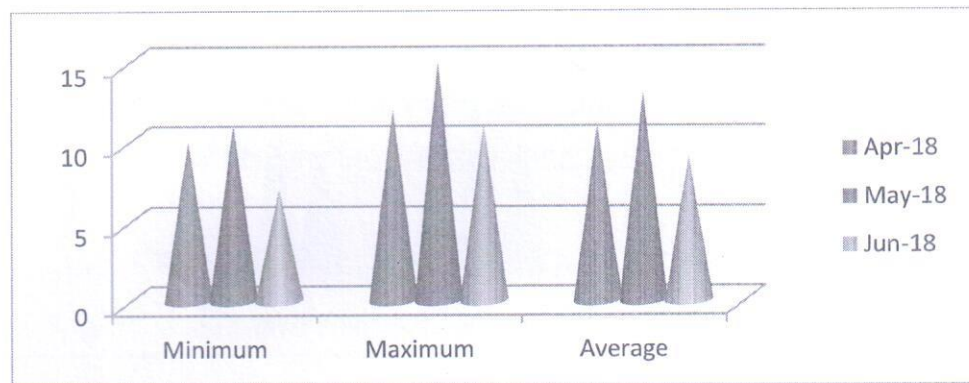
**Graph: - Samri Chowk/Nr.Old Weigh Bridge**

**Rajendrapur**

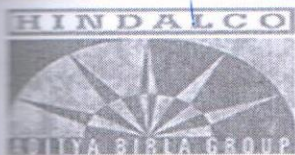
For the month of April-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 10µg/m<sup>3</sup> and 12µg/m<sup>3</sup> respectively and average concentration of 11µg/m<sup>3</sup>.

For the month of May-2018 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 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 June-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>.



**Graph: - Rajendrapur**

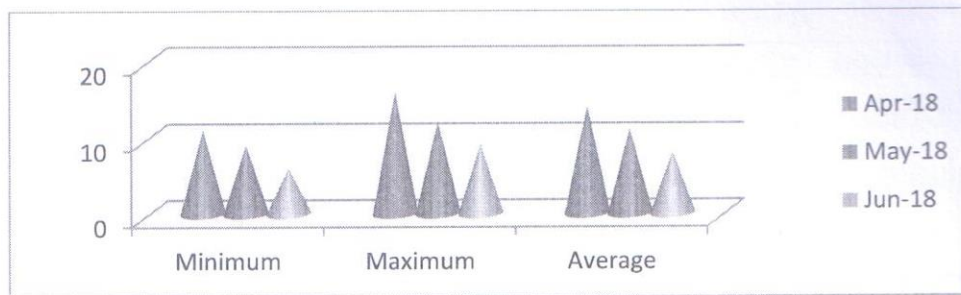


**Tatijharia Village**

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

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



**Graph: - Tatijharia Village**

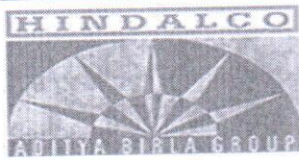


Table 10  
Statistical Analysis of NO<sub>x</sub>

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
Sairaidh Campus	April-2018	23	31	27	27	31
	May-2018	22	34	28	28	34
	June-2018	16	18	17	17	18
New Kudag/Nr. Weigh Bridge	April-2018	21	32	27	27	32
	May-2018	22	29	26	26	29
	June-2018	17	23	20	20	23
Old Kudag/Mining Area	April-2018	24	31	28	28	31
	May-2018	24	30	27	27	30
	June-2018	16	24	20	20	24
Khas Kudag	April-2018	24	32	28	28	32
	May-2018	22	30	26	26	30
	June-2018	16	28	22	22	28
<b>CPCB Standard</b>				<b>80 µg/m<sup>3</sup> (24 hrs)</b>		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
Jaljali Village	April-2018	15	20	18	18	20
	May-2018	17	23	20	20	23
	June-2018	13	16	15	15	16
Samri Chowk/ Nr.Old Weigh Bridge	April-2018	15	25	20	20	25
	May-2018	15	23	19	19	23
	June-2018	12	17	15	15	17
Rajendrapur	April-2018	18	25	22	22	25
	May-2018	17	26	22	22	26
	June-2018	13	18	16	16	18
Tatijharia Village	April-2018	15	21	18	18	21
	May-2018	17	20	19	19	20
	June-2018	13	17	15	15	17
<b>CPCB Standard</b>				<b>80 µg/m<sup>3</sup> (24 hrs)</b>		

**Conclusion-A:-**

- Sairaidh Campus Lease Area Core Zone :-** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 24µg/m<sup>3</sup>.
- New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 24µg/m<sup>3</sup>.
- Old Kudag/Mining Lease Area Core Zone: -** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 25µg/m<sup>3</sup>.
- Khas Kudag Lease Area Core Zone: -** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 25µg/m<sup>3</sup>.

• The Average Concentration of NO<sub>x</sub> within the core zone of Kudag Lease is 25µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.

**Conclusion-B:-**

- Jaljali Village Lease Area Buffer Zone :-** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 18µg/m<sup>3</sup>.
  - Samri Chowk Lease Area Buffer Zone :-** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 18µg/m<sup>3</sup>.
  - Rajendrapur Lease Area Buffer Zone: -** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 20µg/m<sup>3</sup>.
  - Tatijharia Village Lease Area Buffer Zone: -** For the Months of Apr-May-June-2018 Avg. of NO<sub>x</sub> is 17µg/m<sup>3</sup>.
- The Average Concentration of NO<sub>x</sub> within the Buffer Zone of Kudag Lease is 18µg/m<sup>3</sup> 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.**

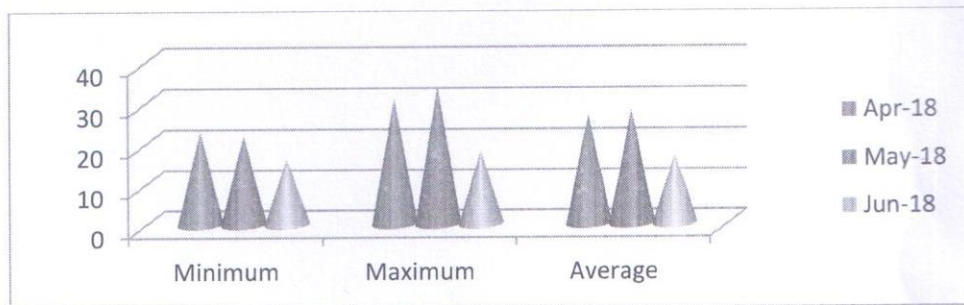
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of April-2018 to June-2018 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum\* and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring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

**Sairaidh Campus**

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 23 µg/m<sup>3</sup> and 31 µg/m<sup>3</sup> respectively and average concentration of 27 µg/m<sup>3</sup>.

For the month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22 µg/m<sup>3</sup> and 34 µg/m<sup>3</sup> respectively and average concentration of 28 µg/m<sup>3</sup>.

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



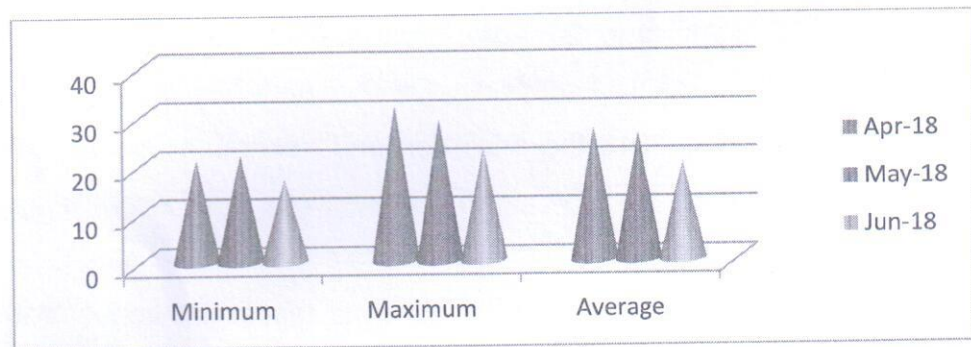
**Graph :- Sairaidh Campus**

**New Kudag/Nr.Weigh Bridge**

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21 µg/m<sup>3</sup> and 32 µg/m<sup>3</sup> respectively and average concentration of 27 µg/m<sup>3</sup>.

For the month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22 µg/m<sup>3</sup> and 29 µg/m<sup>3</sup> respectively and average concentration of 26 µg/m<sup>3</sup>.

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



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

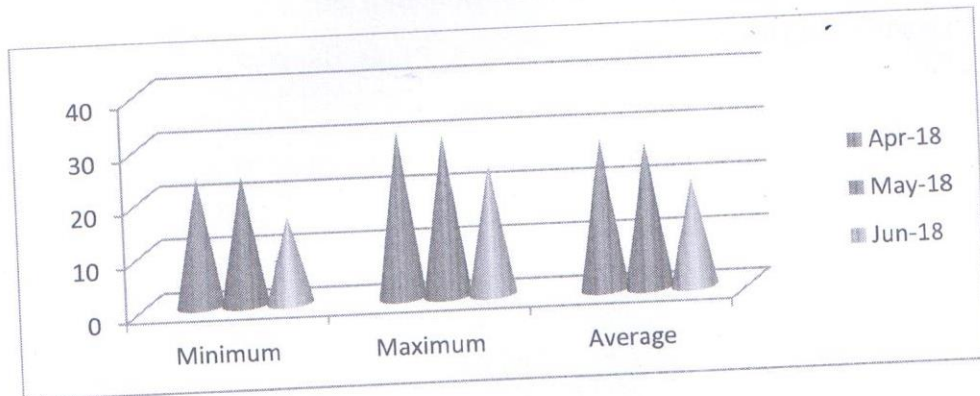


**Old Kudag/Mining Area**

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 24 µg/m<sup>3</sup> and 31 µg/m<sup>3</sup> respectively and average concentration of 28 µg/m<sup>3</sup>.

For the month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 24 µg/m<sup>3</sup> and 30 µg/m<sup>3</sup> respectively and average concentration of 27 µg/m<sup>3</sup>.

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



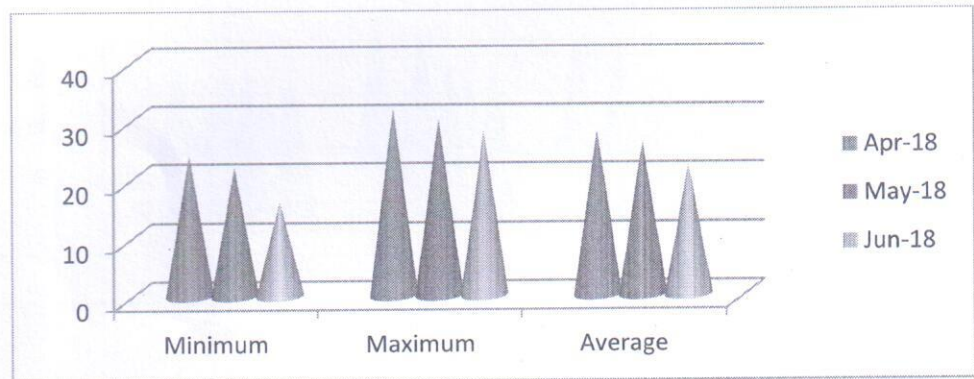
**Graph: - Old Kudag/Mining Area**

**Khas Kudag**

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 24 µg/m<sup>3</sup> and 32 µg/m<sup>3</sup> respectively and average concentration of 28 µg/m<sup>3</sup>.

For the month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22 µg/m<sup>3</sup> and 30 µg/m<sup>3</sup> respectively and average concentration of 26 µg/m<sup>3</sup>.

For the month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16 µg/m<sup>3</sup> and 28 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.



**Graph: - Khas Kudag**

## 2.9 Fugitive Emission (Buffer Zone):-

### 2.9.1 Presentation of Results.

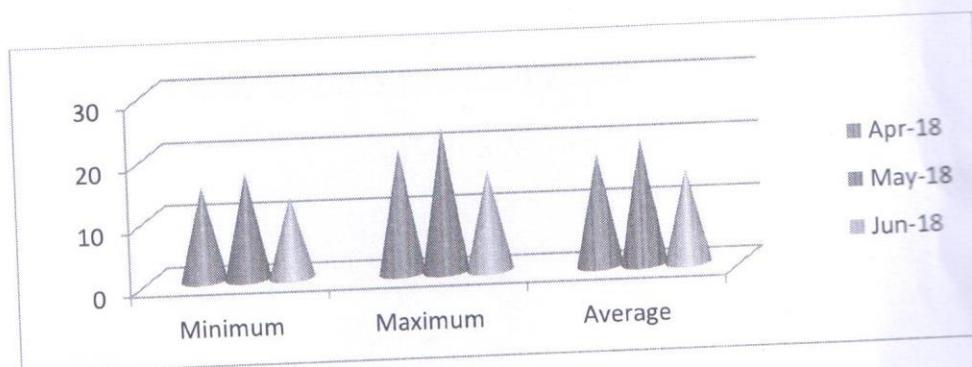
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of April-2018 to June-2018 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring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

#### Jaljali Village

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup> respectively and average concentration of 18 µg/m<sup>3</sup>.

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

For the month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 13 µg/m<sup>3</sup> and 16 µg/m<sup>3</sup> respectively and average concentration of 15 µg/m<sup>3</sup>.



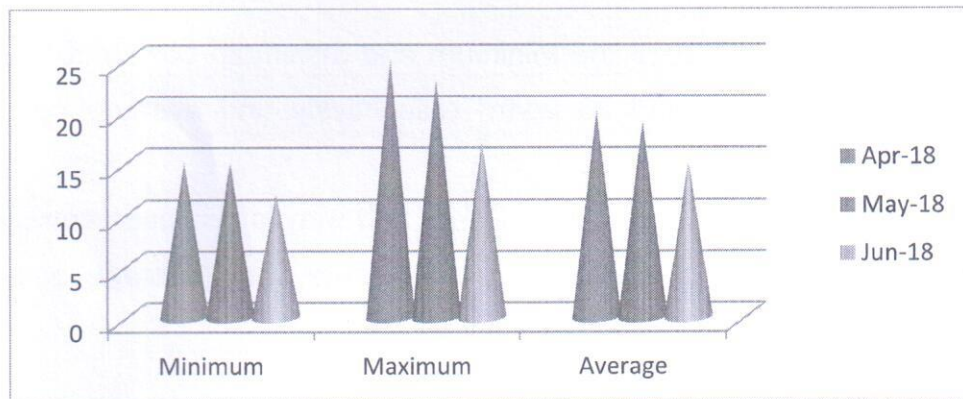
**Graph: - Jaljali Village**

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

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15 µg/m<sup>3</sup> and 25 µg/m<sup>3</sup> respectively and average concentration of 20 µg/m<sup>3</sup>.

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

For the month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 12 µg/m<sup>3</sup> and 17 µg/m<sup>3</sup> respectively and average concentration of 15 µg/m<sup>3</sup>.



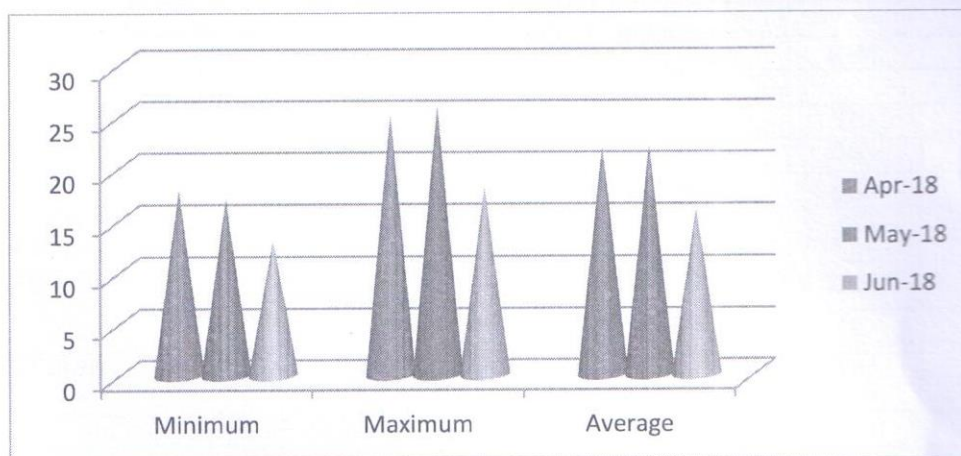
**Graph: - Samri Chowk/Nr.Old Weigh Bridge**

**Rajendrapur**

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 25 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.

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

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



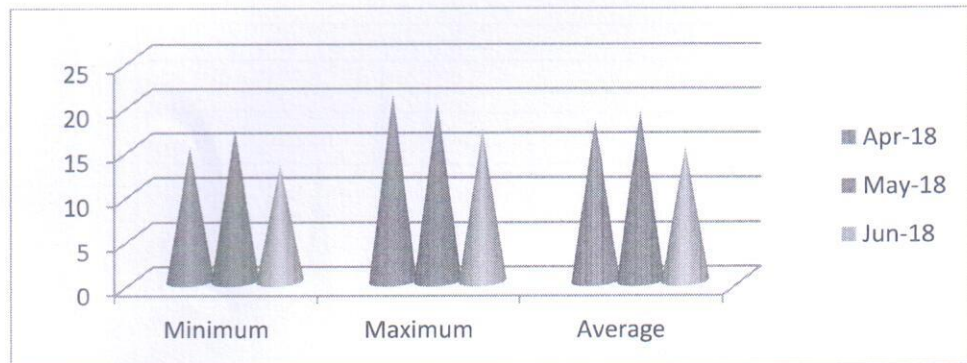
**Graph: - Rajendrapur**

**Tatijharia Village**

For the month of April-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15 µg/m<sup>3</sup> and 21 µg/m<sup>3</sup> respectively and average concentration of 18 µg/m<sup>3</sup>.

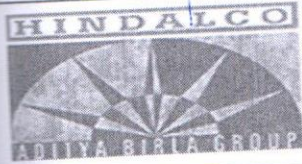
For the month of May-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup> respectively and average concentration of 19 µg/m<sup>3</sup>.

For the month of June-2018 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 13 µg/m<sup>3</sup> and 17 µg/m<sup>3</sup> respectively and average concentration of 15 µg/m<sup>3</sup>.



**Graph: - Tatijharia Village**





**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>	April-2018	0.026	0.034	0.030	0.030	0.034
	May-2018	0.024	0.031	0.028	0.028	0.031
	June-2018	0.017	0.028	0.023	0.023	0.028
<b>New Kudag/Nr. Weigh Bridge</b>	April-2018	0.026	0.037	0.032	0.032	0.037
	May-2018	0.024	0.032	0.028	0.028	0.032
	June-2018	0.019	0.028	0.024	0.024	0.028
<b>Old Kudag/Mining Area</b>	April-2018	0.026	0.031	0.029	0.029	0.031
	May-2018	0.023	0.028	0.026	0.026	0.028
	June-2018	0.018	0.021	0.020	0.020	0.021
<b>Khas Kudag</b>	April-2018	0.027	0.043	0.035	0.035	0.043
	May-2018	0.024	0.038	0.031	0.031	0.038
	June-2018	0.018	0.024	0.021	0.021	0.024
<b>CPCB Standard</b>				<b>1.0 <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>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Rajendrapur</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Tatijharia Village</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>				<b>1.0 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>		

**Conclusion: A)**

The Average Concentration of Pb within the Core Zone of Kudag Lease during this period (April-May-June-2018) is  $0.043\mu\text{g}/\text{m}^3$  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 (April-May-June-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>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>New Kudag/Nr. Weigh Bridge</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Old Kudag/Mining Area</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Khas Kudag</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>		---				
<b>Buffer Zone :</b>						
<b>Jaljali Village</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Rajendrapur</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Tatijharia Village</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>		---				

**Conclusion: A**

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



**Table 13**

**Statistical Analysis of As**

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Sairaidh Campus</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>New Kudag/Nr. Weigh Bridge</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Old Kudag/Mining Area</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Khas Kudag</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>	<b>06 ng/m<sup>3</sup> (Annual)</b>					
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Rajendrapur</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>Tatijharia Village</b>	April-2018	ND	ND	ND	ND	ND
	May-2018	ND	ND	ND	ND	ND
	June-2018	ND	ND	ND	ND	ND
<b>CPCB Standard</b>	<b>06 ng/m<sup>3</sup> (Annual)</b>					

**Conclusion: A**

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



**Free Silica:-**

Sr. No.	Location	Measurement Unit	April-2018		May-2018		June-2018	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Old Kudag/Mining Area	g/100gm	0.26	0.18	0.29	0.16	0.18	0.1

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

Sl.No.	Location	April-2018	May-2018	June-2018	Average
<b>Rate (mt/km<sup>2</sup>/month)</b>					
1	Old Kudag/Mining Area	21.6	24.7	18.2	21.5
2	Khas kudag	18.3	19.6	14.8	17.6

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

Unit: dB(A) Leq

Sl. No.	Location	April-2018		May-2018		June-2018	
		Day	Night	Day	Night	Day	Night
<b>Core Zone</b>							
1	Sairaidh Campus	51.6	42.8	54.7	41.9	47.3	38.2
2	New Kudag/Near Weigh Bridge	61.4	52.9	58.3	46.2	51.9	43.1
3	Old Kudag/Mining Area	64.7	56.1	62.8	53.7	48.3	37.2
4	Khas Kudag	58.2	43.7	57.1	43.8	57.9	46.1
<b>Buffer Zone</b>							
1	Jaljali Village	51.6	38.2	48.2	38.1	47.3	37.2
2	Samri Chowk/Nr.Old Weigh Bridge	53.8	41.6	51.9	42.8	52.6	42.1
3	Rajendrapur	47.2	37.3	52.8	38.9	43.7	38.2
4	Tatijharia Village	54.1	43.7	52.6	41.3	48.2	37.2

**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**

**Unit: dB(A) Leq**

Sr. No.	Location	April-2018			May-2018			June-2018		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	New Kudag/Nr.Weigh Bridge	68.3	72.9	<b>70.6</b>	64.3	71.1	<b>67.7</b>	64.7	72.8	<b>68.8</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-June-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	7.31 at 25
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	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.09
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	261
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.26
10.	Cyanide (as CN)	mg/l	IS 3025 (Part 27)	0.05	No relaxation	< 0.05
11.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000	46.38
12.	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 23)	200	600	112.64
13.	Total hardness (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 21)	200	600	180.88
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	57.25
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	9.17
16.	Sulphate (as SO <sub>4</sub> )	mg/l	IS 3025 (Part 24)	200	400	41.68
17.	Nitrate (as NO <sub>3</sub> )	mg/l	APHA Method	45	No relaxation	8.16
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.05
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	< 0.001
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.003
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.01
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	< 0.03
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.01
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	< 0.05
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.02
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.05
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.07
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.05
31.	Sulphide (as H <sub>2</sub> S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.05
32.	Chloramines (as Cl <sub>2</sub> )	mg/l	APHA 4500-Cl <sub>2</sub> G	4.0	No relaxation	< 0.04

Contd.....



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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	---	---	Absent
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

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.



**(Nalahs near Mining Area)**  
**June-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	8.16 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	21
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	7
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	0.43
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	382
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.37
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	162.8
12.	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 23)	200	600	121.64
13.	Total hardness (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 21)	200	600	259.92
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	81.56
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	131.25
17.	Nitrate (as NO <sub>3</sub> )	mg/l	APHA Method	45	No relaxation	12.68
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.05
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	< 0.001
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.003
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	< 0.03
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.01
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	< 0.02
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.05
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.05
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.05
31.	Sulphide (as H <sub>2</sub> S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.05
32.	Chloramines (as Cl <sub>2</sub> )	mg/l	APHA 4500-Cl <sub>2</sub> G	4.0	No relaxation	< 0.05

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

**Details of Salient**  
**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	---	---	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

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.



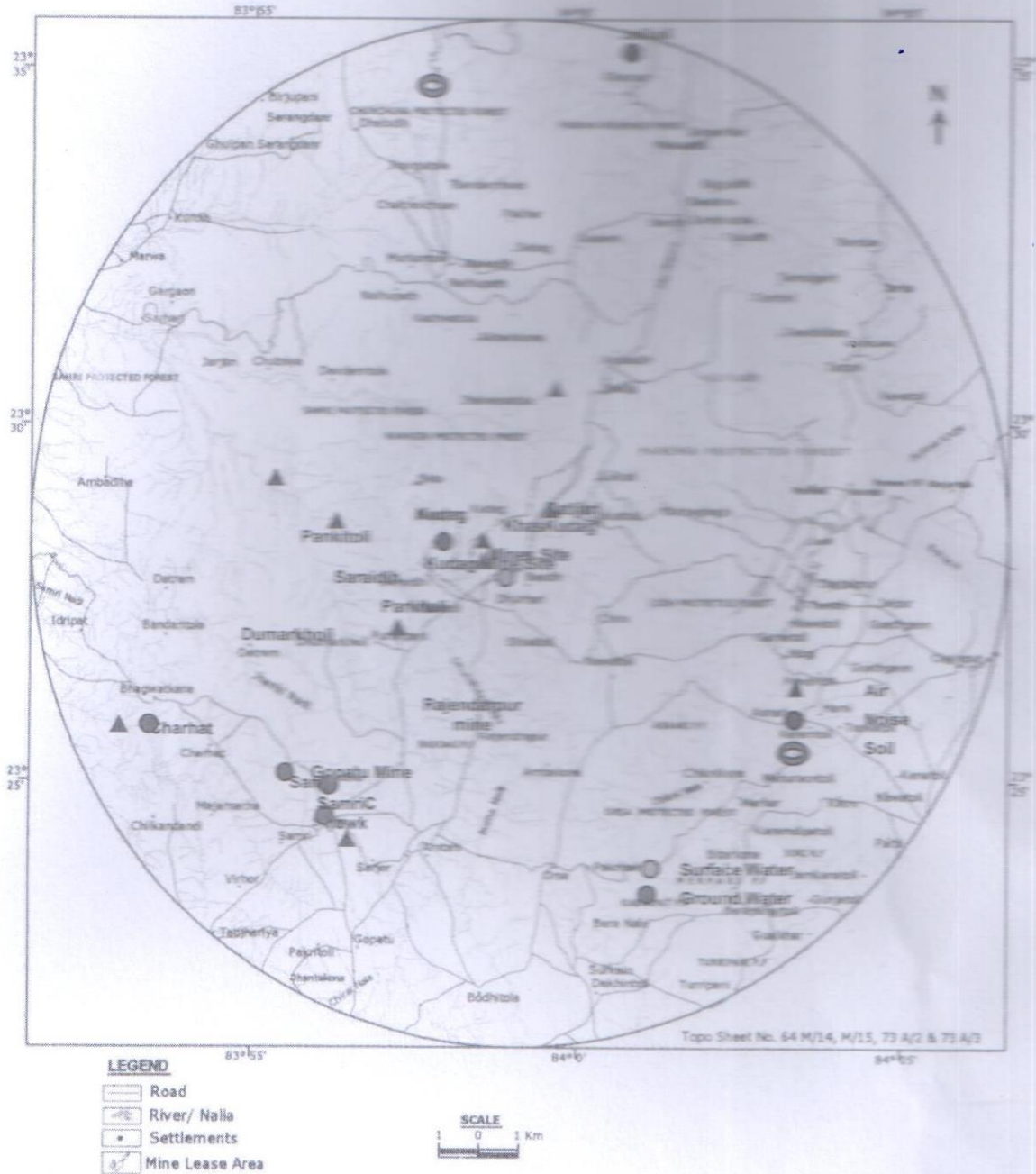
**Table 18**

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

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/Mining Area
1.	PH (1:5 water extract)	-	6.94 at 25°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	149.2
3.	Texture	-	Silty Clay
4.	Sand	%	35.10
5.	Slit	%	37.68
6.	Clay	%	27.22
7.	Water Holding Capacity	%	24.50
8.	Bulk Density	g/cc	1.46
9.	Porosity	%	11.54
10.	Exchangeable Calcium (as Ca)	mg/Kg	846.4
11.	Exchangeable Magnesium (as Mg)	mg/Kg	152.9
12.	Exchangeable Manganese (as Mn)	mg/Kg	126.3
13.	Exchangeable Zinc (as Zn)	mg/Kg	74.2
14.	Available Boron (as B)	mg/Kg	ND
15.	Water Soluble Chloride (as Cl <sup>+</sup> )	mg/Kg	530.4
16.	Water Soluble Sulphate (as SO <sub>4</sub> )	mg/Kg	708.89
17.	Available Potassium (as K)	mg/Kg	373.39
18.	Available Phosphorous (as P)	Kg/hec	12.32
19.	Available Nitrogen (as N)	Kg/hec	150.38
20.	Cadmium (as Cd)	mg/Kg	ND
21.	Chromium (as Cr)	mg/Kg	ND
22.	Copper (as Cu)	mg/Kg	0.02
23.	Lead (as Pb)	mg/Kg	ND
24.	Total Iron	mg/Kg	1094
25.	Organic Matter	%	1.24
26.	Organic Carbon	%	0.45
27.	CEC	meq/100g	14.23

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

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



**Fig 5: Sampling Locations for Water**