

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

**Duration: July-August-September-2015**

Sponsor:-



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

Prepared By :-



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.04/10/2012 valid up to  
03.10.2016

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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 **July-2015 to September-2015** 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.**



Authorized Signatory

Place : Nagpur

Date : September, 2015



## **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 (*July-August-September-2015*) 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: **(Table 1)**





**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.)**

Sr. No.	Core Zone	Sr.	Buffer Zone
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 July-August-September-2015. 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 July-August-September-2015 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) (August-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 solution) 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 July-2015 to September-2015 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)/NAAQ for residential and rural zone.

### 1.6.1 Presentation of Results.

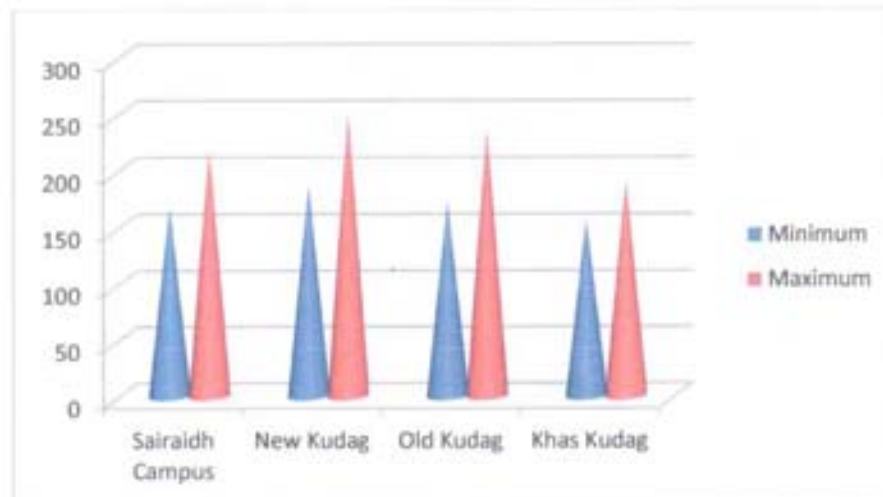
#### Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 157  $\mu\text{g}/\text{m}^3$  and 251  $\mu\text{g}/\text{m}^3$  respectively. The average concentrations were ranged between 165 to 226  $\mu\text{g}/\text{m}^3$ . and 98<sup>th</sup> percentile values ranged between 173 to 250  $\mu\text{g}/\text{m}^3$  in the study area

(Table 6).

#### Graphical Presentation Of Fugitive Emission Monitoring

### SPM



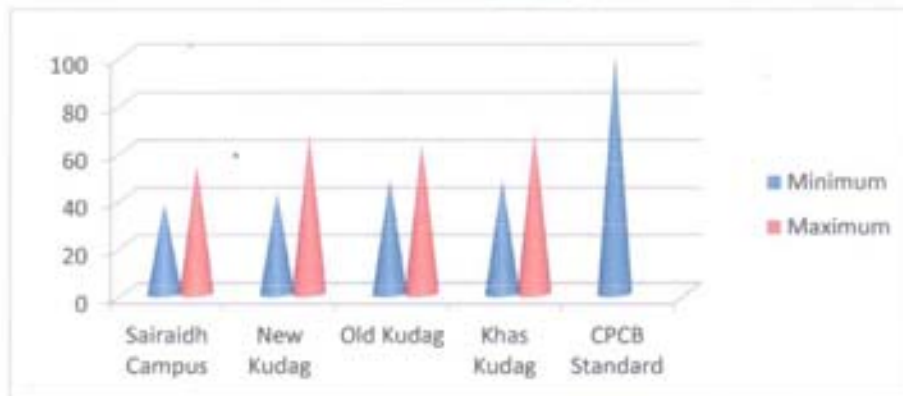


### Respirable Suspended Particulate Matter –RSPM

The minimum and maximum concentrations for RSPM were recorded as 38  $\mu\text{g}/\text{m}^3$  and 68  $\mu\text{g}/\text{m}^3$  respectively. The average values were observed to be in the range of 43 to 60  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 47 to 68  $\mu\text{g}/\text{m}^3$  in the study area (**Table 7**).

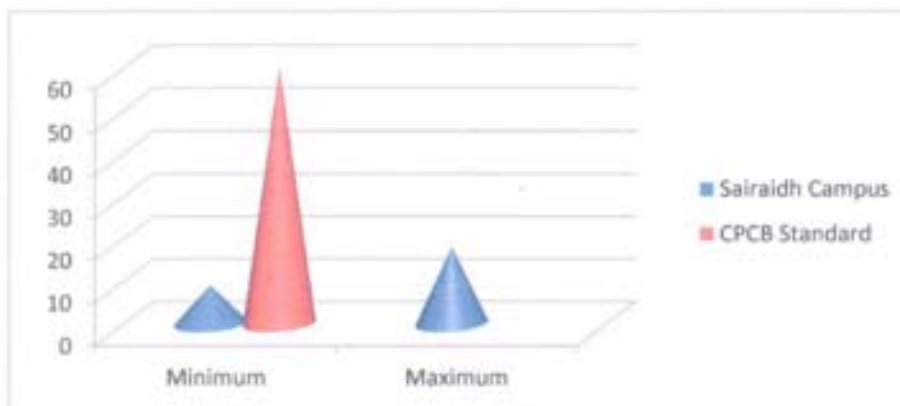
### Graphical Presentation Of Fugitive Emission Monitoring

#### RSPM



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

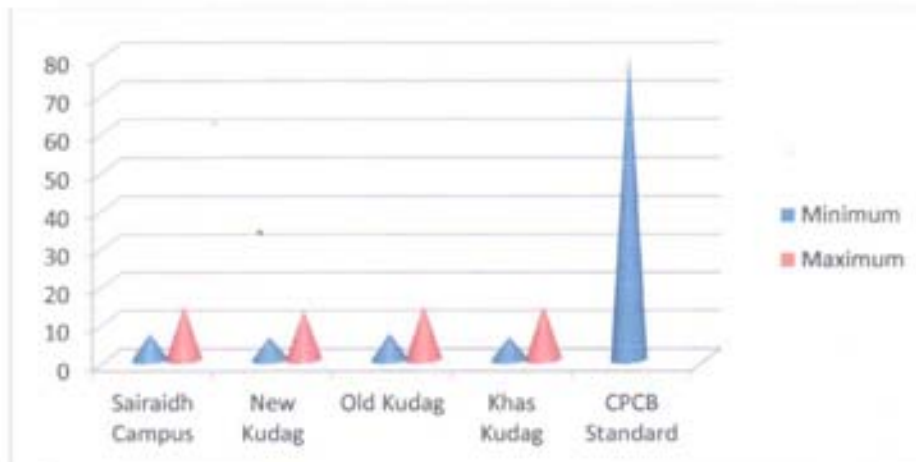
The minimum and maximum values of PM<sub>2.5</sub> concentrations varied between 9 to 18  $\mu\text{g}/\text{m}^3$  respectively. The average values range between 12 to 16  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values varied between 14 to 18  $\mu\text{g}/\text{m}^3$  (**Table 8**).



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

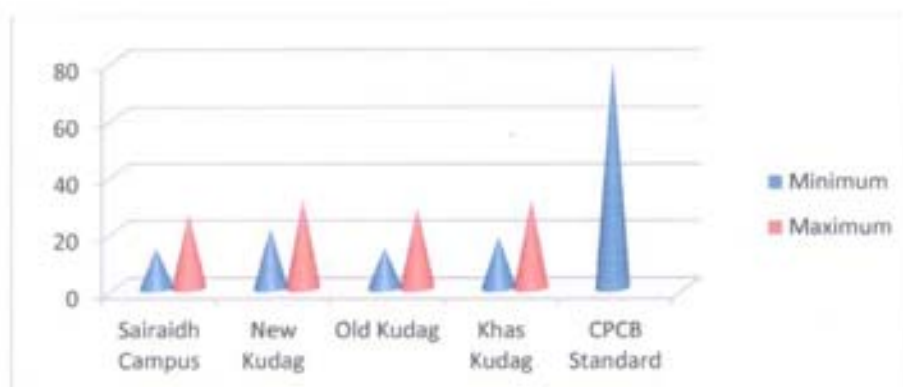
The minimum and maximum SO<sub>2</sub> concentrations were recorded as 6 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively. The average values were observed to be in the range of 8 to 11 µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 9 to 14 µg/m<sup>3</sup> (**Table 9**).

#### 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 14 µg/m<sup>3</sup> and 31 µg/m<sup>3</sup>. The average concentrations were ranged between 17 to 28 µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 19 to 31 µg/m<sup>3</sup> (**Table 10**).





### **Lead (Pb)**

The minimum and maximum Lead detected between  $<0.005$  to  $0.034 \mu\text{g}/\text{m}^3$  respectively. The average Lead detected between  $<0.005$  to  $0.028 \mu\text{g}/\text{m}^3$  & 98th percentile values varied between  $<0.005$  to  $0.034 \mu\text{g}/\text{m}^3$  in the study region. **(Table 11)**.

### **Mercury (Hg)**

The maximum concentrations of Hg varied  $0.029 \mu\text{g}/\text{m}^3$  respectively. The average concentration varied  $0.024 \mu\text{g}/\text{m}^3$  98th percentiles values varied  $0.029 \mu\text{g}/\text{m}^3$  in the study region. **(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(PM<sub>10</sub>), PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, 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**).

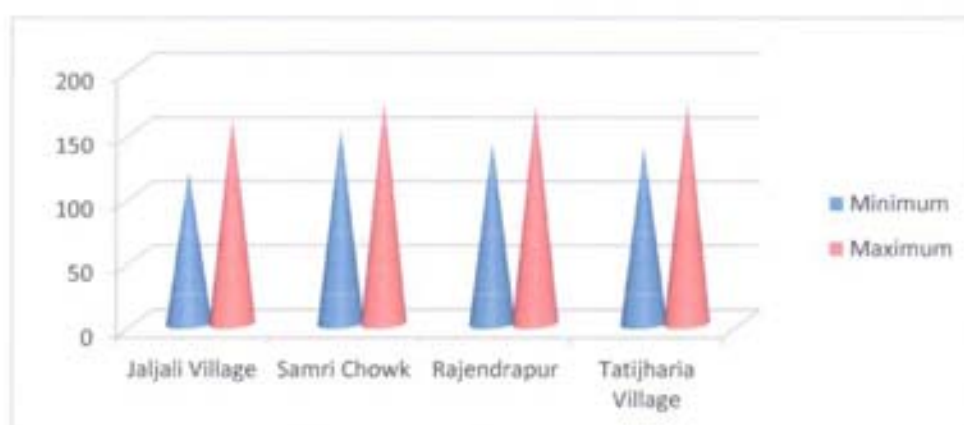
### 1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month of July to September 2015 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)/NAAQ 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 118 to 173  $\mu\text{g}/\text{m}^3$  respectively during study period at all the 4 locations. The average values ranged between 135 to 167  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 143 to 173  $\mu\text{g}/\text{m}^3$  in the study area.

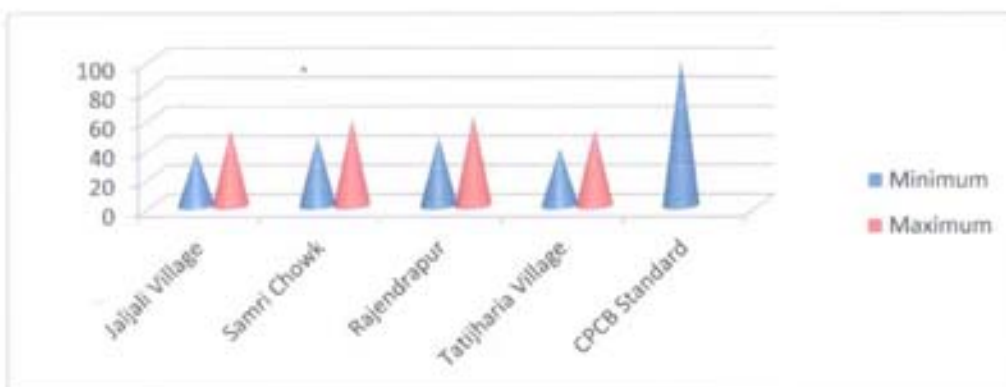
#### Graphical Presentation Of Ambient Air Quality (Buffer Zone)



### Particulate Matter-RSPM

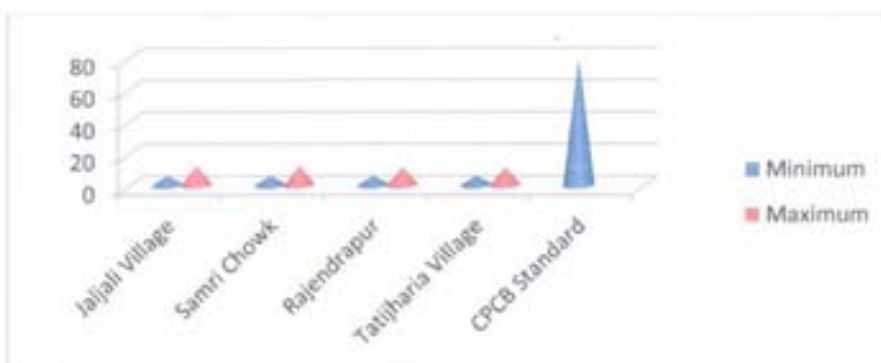
The minimum and maximum values of RSPM varied between 37 to 61  $\mu\text{g}/\text{m}^3$  respectively (**Table 7**). The average values varied between 42 to 57  $\mu\text{g}/\text{m}^3$ . The 98<sup>th</sup> percentile values varied between 46 to 61  $\mu\text{g}/\text{m}^3$  in the mining area. The 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>)

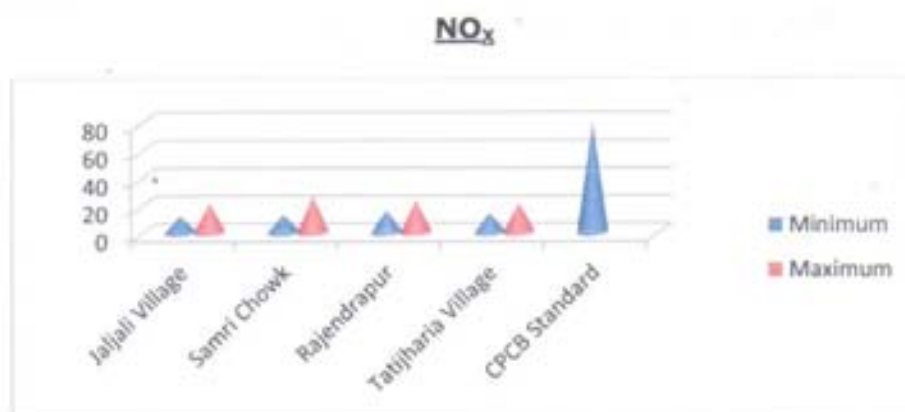
The minimum and maximum values of SO<sub>2</sub> concentrations varied between 6 to 12  $\mu\text{g}/\text{m}^3$  respectively. The average values range between 7 to 10  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values varied between 8 to 12  $\mu\text{g}/\text{m}^3$  (**Table 9**).



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

The minimum and maximum values of NO<sub>x</sub> concentrations varied between 12 to 26 µg/m<sup>3</sup> respectively. The average values range between 14 to 22 µg/m<sup>3</sup> and 98th percentile values varied between 16 to 26 µg/m<sup>3</sup> (Table 10).

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



### Lead (Pb)

The minimum and maximum Lead detected between <0.005 to 0.028 µg/m<sup>3</sup> respectively. The average Lead detected between <0.005 to 0.025 µg/m<sup>3</sup> & 98th percentile values varied between <0.005 to 0.028 µg/m<sup>3</sup> in the study region. (Table 11).

### Mercury (Hg)

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

### Arsenic (As)

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



 <p><b>HINDALCO</b></p>	<p><i>Hindalco Industries Limited Kudag Mining Environmental Status Report for July-2015 To September-2015</i></p>	<p><i>Details of Salient Features</i></p>
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### Chromium (Cr)

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

The dust fall rate was measured by exposing a jar during July to September-2015 in Old Kudag/Mining Area and Khas Kudag village. The dust fall rate was observed to be 21.6 and 17.2 MT/km<sup>2</sup>/month respectively as given in **(Table 14)**.

Overall the ambient air concentrations of SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>, Pb, 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

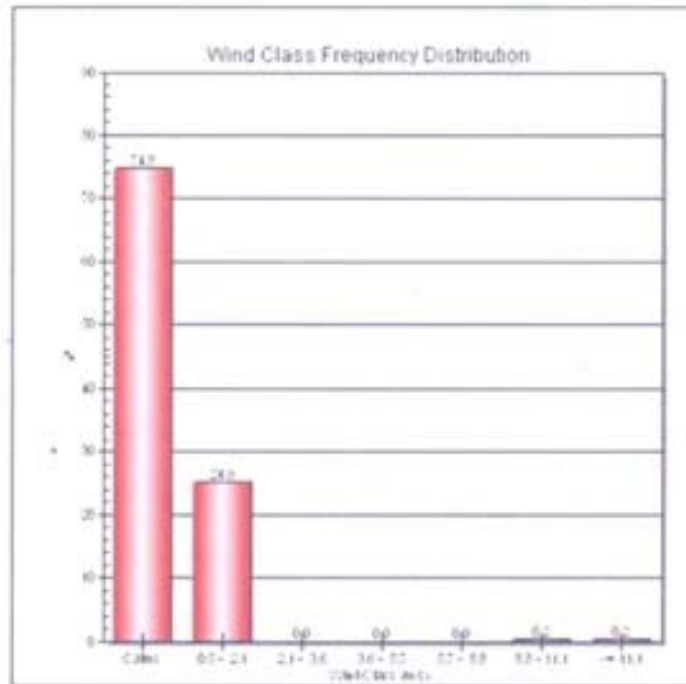
The data of wind pattern collected during the study period (July-Aug-Sep, 2015) indicates that the wind was blowing predominantly from (W and SW) directions, during study period, for 64.23 % wind was found to be calm. The details of wind pattern in the form of wind frequency distribution are presented in Table 1. The wind rose diagram and graphical illustration 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	N	0	0	0	0	0	0	0
2	NNE	0	0	0	0	0	0	0
3	NE	3.85852	0	0	0	0	0	3.31492
4	ENE	0.16077	0	0	0	0	0	0.13812
5	E	3.37621	0	0	0	0.16077	0	3.03867
6	ESE	0.80386	0	0	0	0	0	0.69061
7	SE	1.28617	0	0	0	0	0	1.10497
8	SSE	0.16077	0	0	0	0	0	0.13812
9	S	0.48232	0	0	0	0	0	0.41436
10	SSW	0.48232	0	0	0	0	0	0.41436
11	SW	4.34084	0	0	0	0	0	3.72928
12	WSW	0	0	0	0	0	0	0
13	W	8.5209	0	0	0	0	0.16077	7.45856
14	WNW	0.32154	0	0	0	0	0	0.27624
15	NW	0.96463	0	0	0	0	0	0.82873
16	NNW	0.16077	0	0	0	0	0	0.13812
	Sub-Total	21.4088	0	0	0	0.13812	0.13812	21.6851
	Calms							64.2265
	Missing/incomplete							14.0884
	Total							100

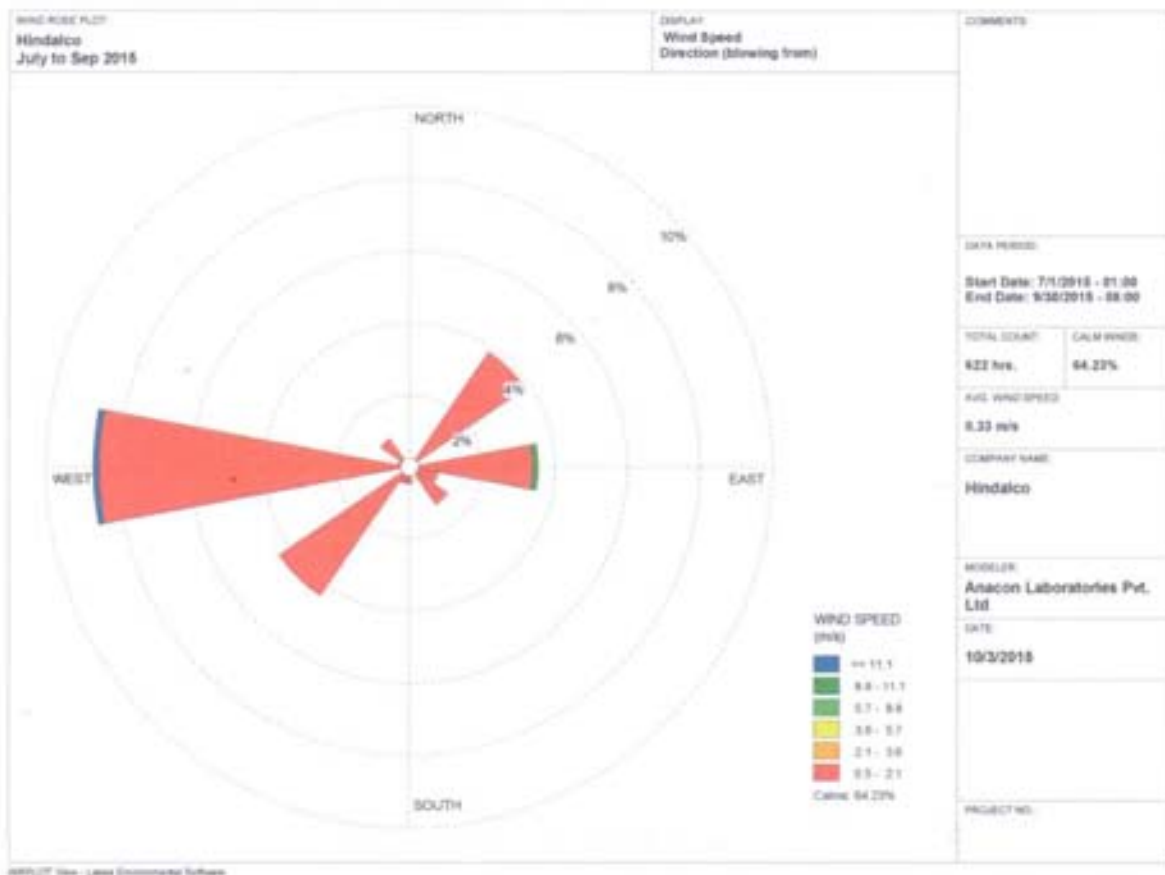
#### SUMMARY OF WIND PATTERN

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
July-Aug-Sep, 2015	W (8.5%)	SW (6.2%)	64.23%



**Figure.01: Wind Class Frequency Distribution**





**Figure.02: Wind Rose Diagram (July-Aug-Sep, 2015)**



### **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 may 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 may 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>						
Sairaidh Campus	July-2015	172	204	188	188	203
	August-2015	168	192	180	180	192
	September-2015	183	219	201	201	218
New Kudag/Nr. Weigh Bridge	July-2015	204	237	221	221	236
	August-2015	187	209	198	198	209
	September-2015	201	251	226	226	250
Old Kudag/Mining Area	July-2015	173	209	191	191	208
	August-2015	182	216	199	199	215
	September-2015	201	238	220	220	237
Khas Kudag	July-2015	157	173	165	165	173
	August-2015	162	191	177	177	190
	September-2015	159	182	171	171	182
<b>Buffer Zone :-</b>						
Jaljali Village	July-2015	118	159	139	139	158
	August-2015	127	143	135	135	143
	September-2015	138	161	150	150	161
Samri Chowk/ Nr.Old Weigh Bridge	July-2015	157	164	161	161	164
	August-2015	161	173	167	167	173
	September-2015	152	169	161	161	169
Rajendrapur	July-2015	141	163	152	152	163
	August-2015	152	171	162	162	171
	September-2015	149	161	155	155	161
Tatijharia Village	July-2015	138	164	151	151	163
	August-2015	147	173	160	160	172
	September-2015	139	158	149	149	158

Note :- All the Values are in CPCB Limit

**Fugitive Emission (Core Zone):- (Average of SPM July-August-September-2015)**

**Sairaidh Campus :-** For the Months of July-August-Sept-2015 Average of SPM is  $190 \mu\text{g}/\text{m}^3$ .

**New Kudag/Nr.Weigh Bridge:-**For the Months of July-Aug-Sept-2015 Average of SPM is  $215 \mu\text{g}/\text{m}^3$ .

**Old Kudag/Mining Area:-** For the Months of July-Aug-Sept-2015 Average of SPM is  $203 \mu\text{g}/\text{m}^3$ .

**Khas Kudag:-** For the Months of July-Aug-Sept-2015 Average of SPM is  $171 \mu\text{g}/\text{m}^3$ .

**Buffer Zone :-**

**Jaljali Village :-** For the Months of July-Aug-Sept-2015 Average of SPM is  $141 \mu\text{g}/\text{m}^3$ .

**Samri Chowk :-** For the Months of July-Aug-Sept-2015 Average of SPM is  $163 \mu\text{g}/\text{m}^3$ .

**Rajendrapur:-** For the Months of July-Aug-Sept-2015 Average of SPM is  $156 \mu\text{g}/\text{m}^3$ .

**Tatijharia Village:-** For the Months of July-Aug-Sept-2015 Average of SPM is  $153 \mu\text{g}/\text{m}^3$ .



### Monthwise Summary of Statistical Analysis of SPM

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

##### 2.1.1 Presentation of Results.

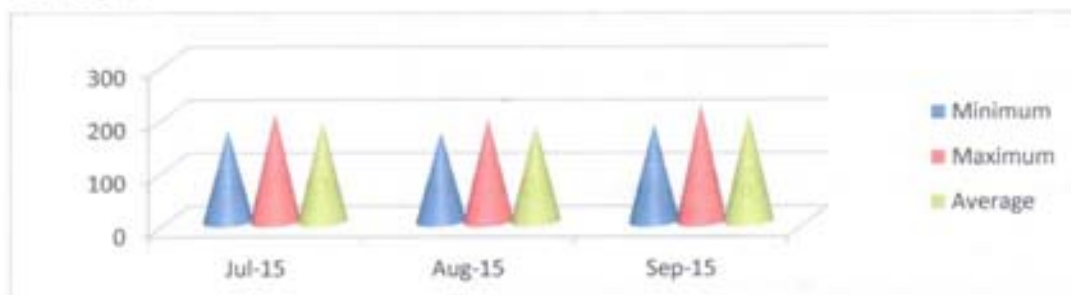
The summary of Statistical Analysis of SPM results for the month of July 2015 to September 2015 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

##### Sairaidh Campus

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $172 \mu\text{g}/\text{m}^3$  and  $204 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $188 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $168 \mu\text{g}/\text{m}^3$  and  $192 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $180 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $183 \mu\text{g}/\text{m}^3$  and  $219 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $201 \mu\text{g}/\text{m}^3$ .



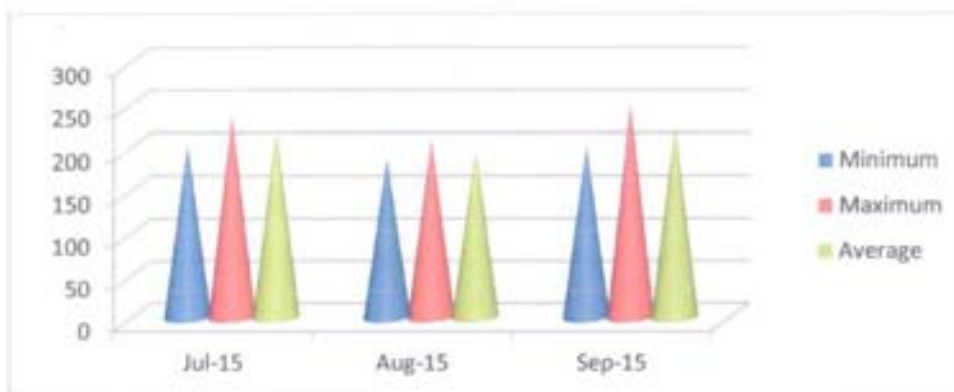
**Graph :- Sairaidh Campus**

**New Kudag/Nr.Weigh Bridge**

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $204 \mu\text{g}/\text{m}^3$  and  $237 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $221 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $187 \mu\text{g}/\text{m}^3$  and  $209 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $198 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $201 \mu\text{g}/\text{m}^3$  and  $251 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $226 \mu\text{g}/\text{m}^3$ .



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

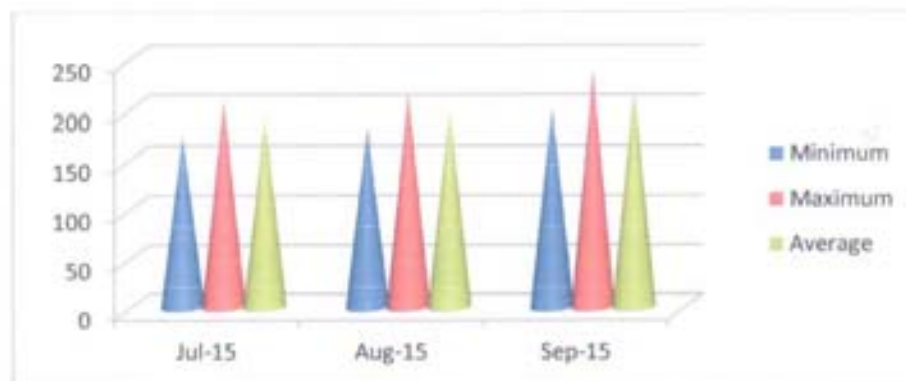


### Old Kudag/Mining Area

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $173 \mu\text{g}/\text{m}^3$  and  $209 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $191 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $182 \mu\text{g}/\text{m}^3$  and  $216 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $199 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $201 \mu\text{g}/\text{m}^3$  and  $238 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $220 \mu\text{g}/\text{m}^3$ .



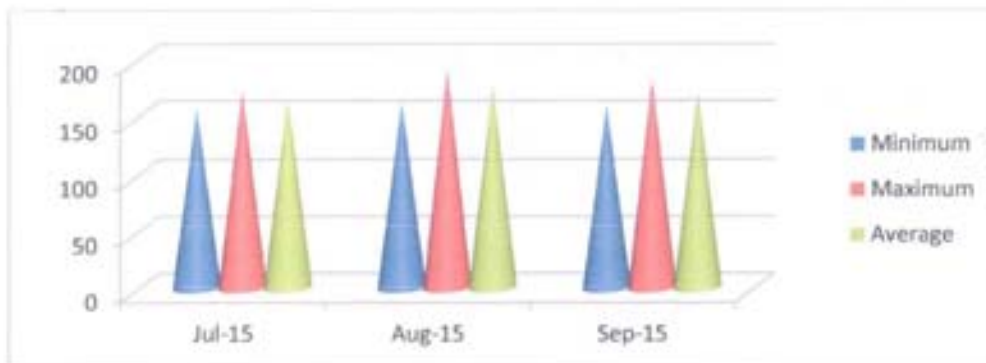
Graph:- Old Kudag/Mining Area

**Khas Kudag**

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $157 \mu\text{g}/\text{m}^3$  and  $173 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $165 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $162 \mu\text{g}/\text{m}^3$  and  $191 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $177 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $159 \mu\text{g}/\text{m}^3$  and  $182 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $171 \mu\text{g}/\text{m}^3$ .



**Graph:- Khas Kudag**





## 2.2 Fugitive Emission (Buffer Zone):-

### 2.2.1 Presentation of Results.

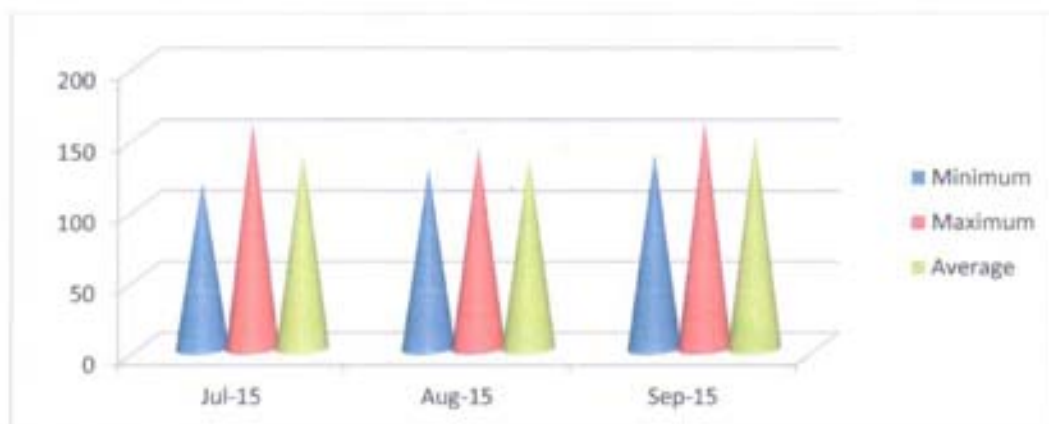
The summary of Statistical Analysis of SPM results for the month of July 2015 to September 2015 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $118 \mu\text{g}/\text{m}^3$  and  $159 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $139 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $127 \mu\text{g}/\text{m}^3$  and  $143 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $135 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $138 \mu\text{g}/\text{m}^3$  and  $161 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $150 \mu\text{g}/\text{m}^3$ .



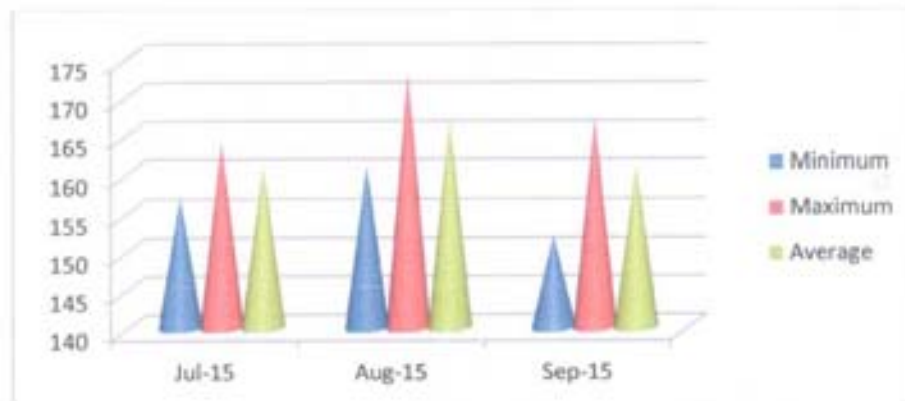
**Graph:- Jaljali Village**

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

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $157 \mu\text{g}/\text{m}^3$  and  $164 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $161 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $161 \mu\text{g}/\text{m}^3$  and  $173 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $167 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $152 \mu\text{g}/\text{m}^3$  and  $169 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $161 \mu\text{g}/\text{m}^3$ .



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

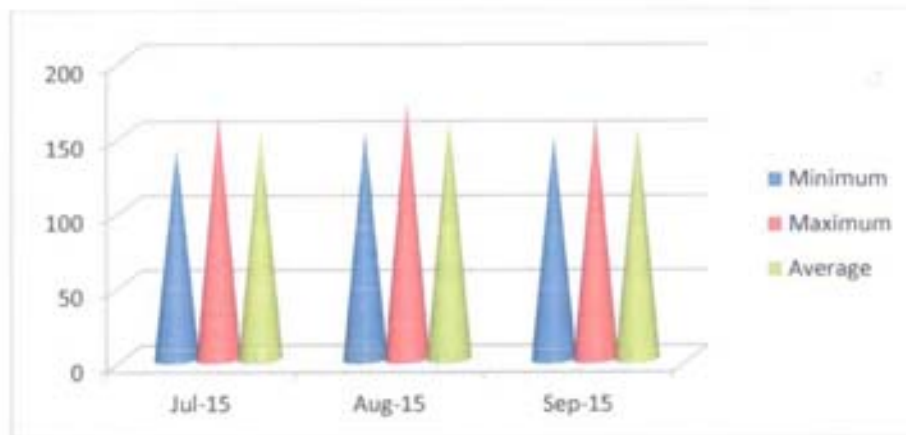


### Rajendrapur

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $141 \mu\text{g}/\text{m}^3$  and  $163 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $152 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $152 \mu\text{g}/\text{m}^3$  and  $171 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $162 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $149 \mu\text{g}/\text{m}^3$  and  $161 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $155 \mu\text{g}/\text{m}^3$ .



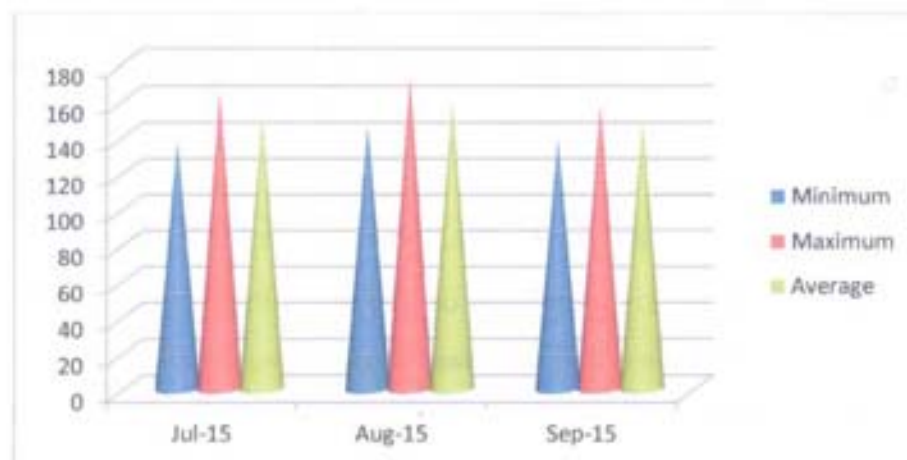
Graph:- Rajendrapur

### Tatijharia Village

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as  $138 \mu\text{g}/\text{m}^3$  and  $164 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $151 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as  $147 \mu\text{g}/\text{m}^3$  and  $173 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $160 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as  $139 \mu\text{g}/\text{m}^3$  and  $158 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $149 \mu\text{g}/\text{m}^3$ .



Graph:- Tatijharia Village



	<b>Hindalco Industries Limited</b> <b>Kudag Mining Environmental Status Report for</b> <b>July-2015 To September-2015</b>	<b>Details of Salient</b> <b>Features</b>
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**Table 7**

**Statistical Analysis of RSPM**

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Sairaidh Campus</b>	July-2015	43	52	48	48	52
	August-2015	46	54	50	50	54
	September-2015	38	47	43	43	47
<b>New Kudag/Nr. Weigh Bridge</b>	July-2015	42	51	47	47	51
	August-2015	46	56	51	51	56
	September-2015	52	67	60	60	67
<b>Old Kudag/Mining Area</b>	July-2015	48	61	55	55	61
	August-2015	52	59	56	56	59
	September-2015	56	63	60	60	63
<b>Khas Kudag</b>	July-2015	48	61	55	55	61
	August-2015	52	68	60	60	68
	September-2015	49	57	53	53	57
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	July-2015	43	48	46	46	48
	August-2015	37	46	42	42	46
	September-2015	41	52	47	47	52
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	July-2015	48	56	52	52	56
	August-2015	51	59	55	55	59
	September-2015	47	52	50	50	52
<b>Rajendrapur</b>	July-2015	48	53	51	51	53
	August-2015	52	61	57	57	61
	September-2015	47	59	53	53	59
<b>Tatijharia Village</b>	July-2015	46	52	49	49	52
	August-2015	39	46	43	43	46
	September-2015	42	51	47	47	51
<b>CPCB Standard</b>		<b>100 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

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

**Fugitive Emission (Core Zone):- (Average of RSPM:- July-August-September-2015)**

**Sairaidh Campus :-** For the Months of July-Aug-Sept-2015 Average of RSPM is  $47 \mu\text{g}/\text{m}^3$ .

**New Kudag/Nr. Weigh Bridge:-**For the Months of July-Aug-Sept-2015 Average of RSPM is  $53 \mu\text{g}/\text{m}^3$ .

**Old Kudag/Mining Area:-** For the Months of July-Aug-Sept-2015 Average of RSPM is  $57 \mu\text{g}/\text{m}^3$ .

**Khas Kudag:-** For the Months of July-Aug-Sept-2015 Average of RSPM is  $56 \mu\text{g}/\text{m}^3$ .

**Buffer Zone :-**

**Jaljali Village :-** For the Months of July-Aug-Sept-2015 Average of RSPM is  $45 \mu\text{g}/\text{m}^3$ .

**Samri Chowk :-** For the Months of July-Aug-Sept-2015 Average of RSPM is  $52 \mu\text{g}/\text{m}^3$ .

**Rajendrapur:-** For the Months of July-Aug-Sept-2015 Average of RSPM is  $54 \mu\text{g}/\text{m}^3$ .

**Tatijharia Village:-** For the Months of July-Aug-Sept-2015 Average of RSPM is  $46 \mu\text{g}/\text{m}^3$ .

Monthwise Summary of Statistical Analysis of RSPM

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

**2.3.1 Presentation of Results.**

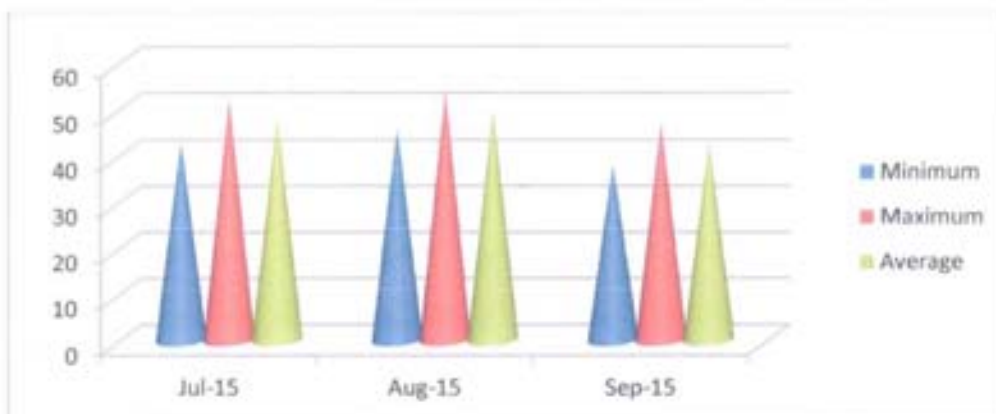
The summary of Statistical Analysis of RSPM results for the month of July 2015 to September 2015 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Sairaidh Campus**

For the month of July-2015 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  $\mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as 46  $\mu\text{g}/\text{m}^3$  and 54  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 50  $\mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as 38  $\mu\text{g}/\text{m}^3$  and 47  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 43  $\mu\text{g}/\text{m}^3$ .



**Graph :- Sairaidh Campus**

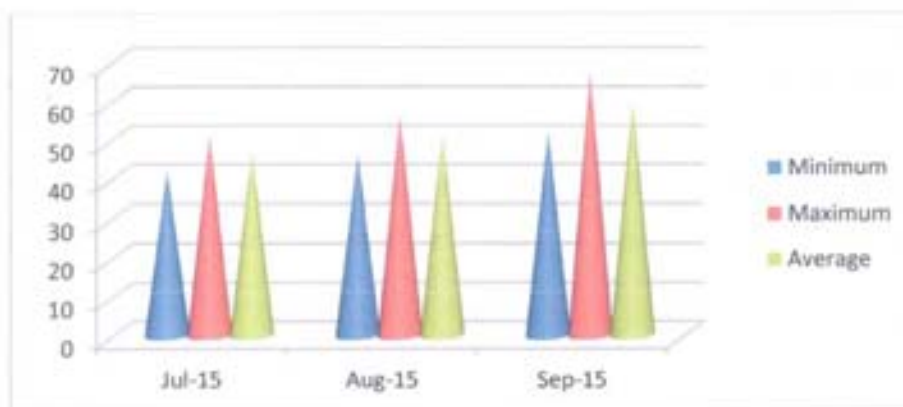


### New Kudag/Nr.Weigh Bridge

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as  $42 \mu\text{g}/\text{m}^3$  and  $51 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $47 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as  $46 \mu\text{g}/\text{m}^3$  and  $56 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $51 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 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  $60 \mu\text{g}/\text{m}^3$ .



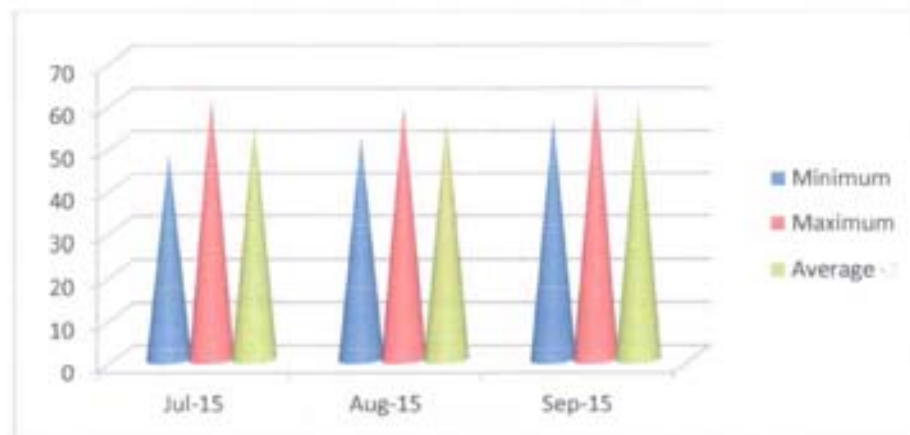
Graph:- New Kudag/Nr.Weigh Bridge

**Old Kudag/Mining Area**

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as  $48 \mu\text{g}/\text{m}^3$  and  $61 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $55 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as  $52 \mu\text{g}/\text{m}^3$  and  $59 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $56 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as  $56 \mu\text{g}/\text{m}^3$  and  $63 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $60 \mu\text{g}/\text{m}^3$ .



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



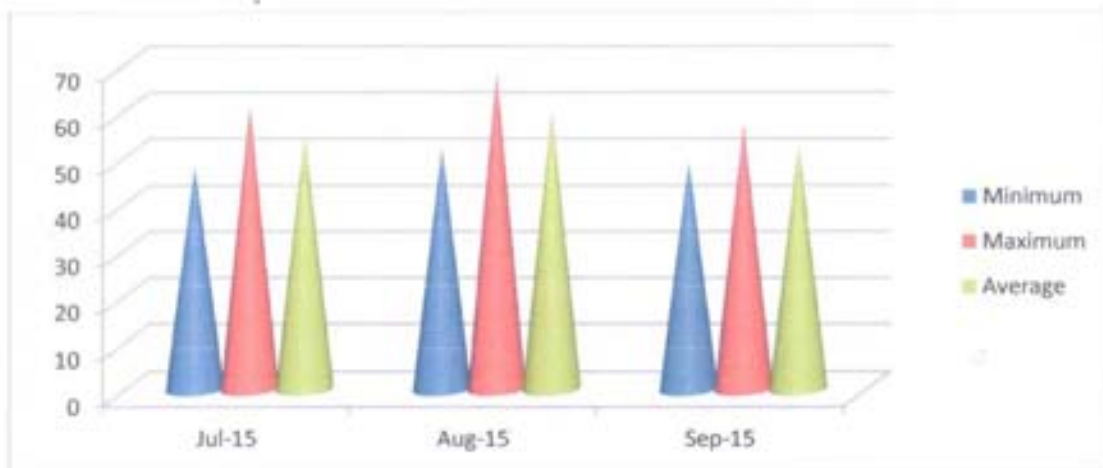


### Khas Kudag

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as  $48 \mu\text{g}/\text{m}^3$  and  $61 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $55 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as  $52 \mu\text{g}/\text{m}^3$  and  $68 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $60 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as  $49 \mu\text{g}/\text{m}^3$  and  $57 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $53 \mu\text{g}/\text{m}^3$ .



Graph:- Khas Kudag

## 2.4 Fugitive Emission (Buffer Zone):-

### 2.4.1 Presentation of Results.

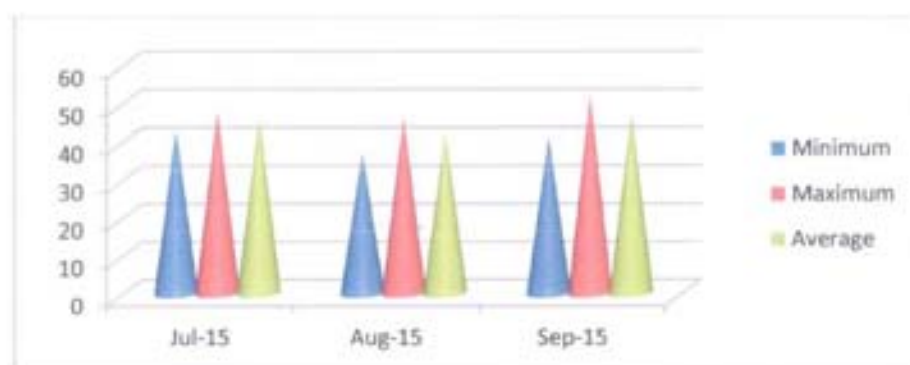
The summary of Statistical Analysis of RSPM results for the month of July 2015 to September 2015 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as 43  $\mu\text{g}/\text{m}^3$  and 48  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 46  $\mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as 37  $\mu\text{g}/\text{m}^3$  and 46  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 42  $\mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as 41  $\mu\text{g}/\text{m}^3$  and 52  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 47  $\mu\text{g}/\text{m}^3$ .



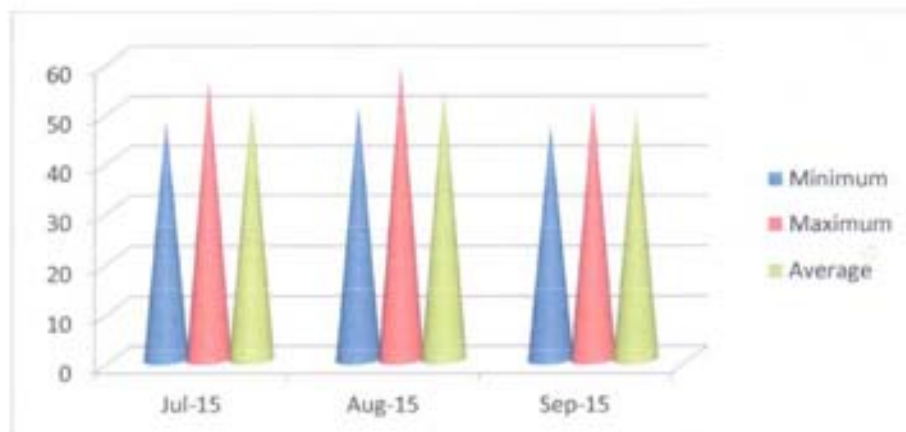
**Graph:- Jaljali Village**

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

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as  $48 \mu\text{g}/\text{m}^3$  and  $56 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $52 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as  $51 \mu\text{g}/\text{m}^3$  and  $59 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $55 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as  $47 \mu\text{g}/\text{m}^3$  and  $52 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $50 \mu\text{g}/\text{m}^3$ .



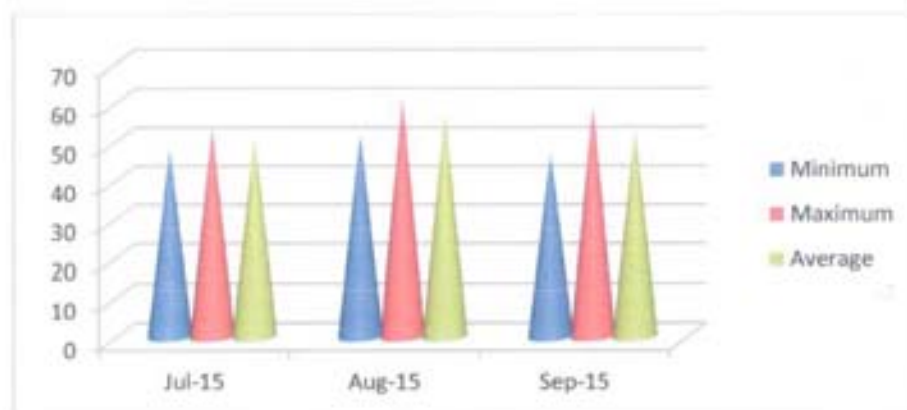
**Graph:- Samri Chowk/Nr.Old Weigh Bridge**

### Rajendrapur

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as  $48 \mu\text{g}/\text{m}^3$  and  $53 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $51 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as  $52 \mu\text{g}/\text{m}^3$  and  $61 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $57 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as  $47 \mu\text{g}/\text{m}^3$  and  $59 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $53 \mu\text{g}/\text{m}^3$ .



**Graph:- Rajendrapur**

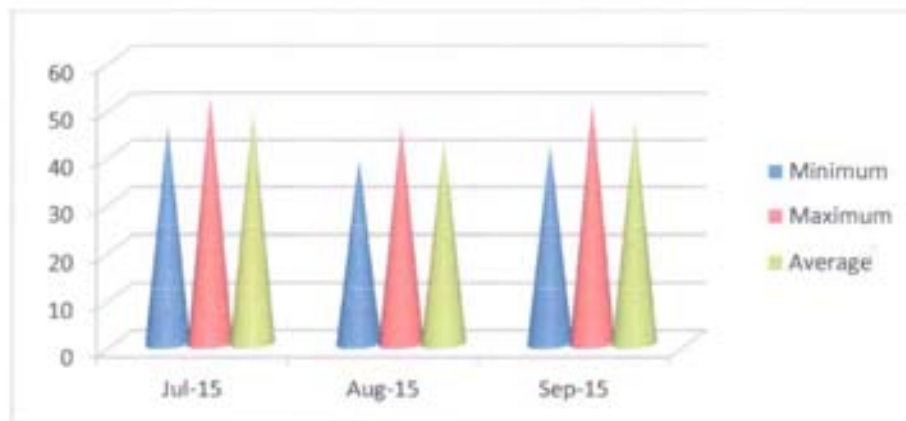


**Tatijharia Village**

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as  $46 \mu\text{g}/\text{m}^3$  and  $52 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $49 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as  $39 \mu\text{g}/\text{m}^3$  and  $46 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $43 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as  $42 \mu\text{g}/\text{m}^3$  and  $51 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $47 \mu\text{g}/\text{m}^3$ .



**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%
Sairaidh Campus	July-2015	9	14	12	12	14
	August-2015	11	16	14	14	16
	September-2015	13	18	16	16	18
<b>CPCB Standard</b>			<b>60 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>			

Note :- All the Values are in CPCB Limit

**Sairaidh Campus** :-Average of PM<sub>2.5</sub> for the month of July-Aug-Sept-2015 is 14  $\mu\text{g}/\text{m}^3$ .

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

**2.5 Presentation of Results.**

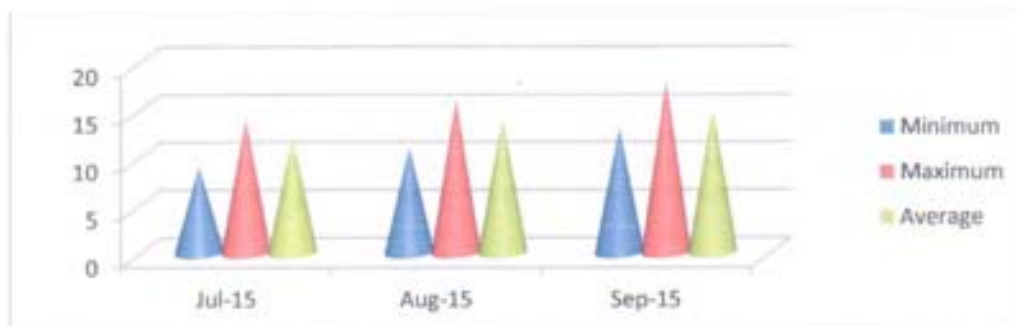
The summary of Statistical Analysis of PM<sub>2.5</sub> results for the month of July 2015 to September 2015 are presented in detail in Table 8. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Sairaidh Campus**

For the month of July-2015 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 9  $\mu\text{g}/\text{m}^3$  and 14  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 12  $\mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 11  $\mu\text{g}/\text{m}^3$  and 16  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 14  $\mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for PM<sub>2.5</sub> were recorded as 13  $\mu\text{g}/\text{m}^3$  and 18  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 16  $\mu\text{g}/\text{m}^3$ .





**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>						
Sairaidh Campus	July-2015	8	13	11	11	13
	August-2015	7	12	10	10	12
	September-2015	8	14	11	11	14
New Kudag/Nr. Weigh Bridge	July-2015	6	9	8	8	9
	August-2015	8	13	11	11	13
	September-2015	6	11	9	9	11
Old Kudag/Mining Area	July-2015	7	12	10	10	12
	August-2015	8	14	11	11	14
	September-2015	7	13	10	10	13
Khas Kudag	July-2015	6	12	9	9	12
	August-2015	8	14	11	11	14
	September-2015	6	9	8	8	9
<b>Buffer Zone :-</b>						
Jaljali Village	July-2015	6	8	7	7	8
	August-2015	7	12	10	10	12
	September-2015	6	9	8	8	9
Samri Chowk/ Nr.Old Weigh Bridge	July-2015	7	11	9	9	11
	August-2015	6	8	7	7	8
	September-2015	7	12	10	10	12
Rajendrapur	July-2015	6	9	8	8	9
	August-2015	7	11	9	9	11
	September-2015	7	11	9	9	11
Tatijharia Village	July-2015	6	8	7	7	8
	August-2015	6	9	8	8	9
	September-2015	7	11	9	9	11
<b>CPCB Standard</b>		<b>80 µg/m<sup>3</sup> (24 hrs)</b>				

Note :- All the Values are in CPCB Limit.

**Fugitive Emission (Core Zone):- (Average of SO<sub>2</sub> July-August-September-2015)**

**Sairaidh Campus :-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 11 µg/m<sup>3</sup>.

**New Kudag/Nr. Weigh Bridge:-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 9 µg/m<sup>3</sup>.

**Old Kudag/Mining Area:-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 10 µg/m<sup>3</sup>.

**Khas Kudag:-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 9 µg/m<sup>3</sup>.

**Buffer Zone :-**

**Jaljali Village :-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 8 µg/m<sup>3</sup>.

**Samri Chowk :-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 9 µg/m<sup>3</sup>.

**Rajendrapur:-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 9 µg/m<sup>3</sup>.

**Tatijharia Village:-** For the Months of July-Aug-Sept-2015 Average of SO<sub>2</sub> is 8 µg/m<sup>3</sup>.



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

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

##### 2.6.1 Presentation of Results.

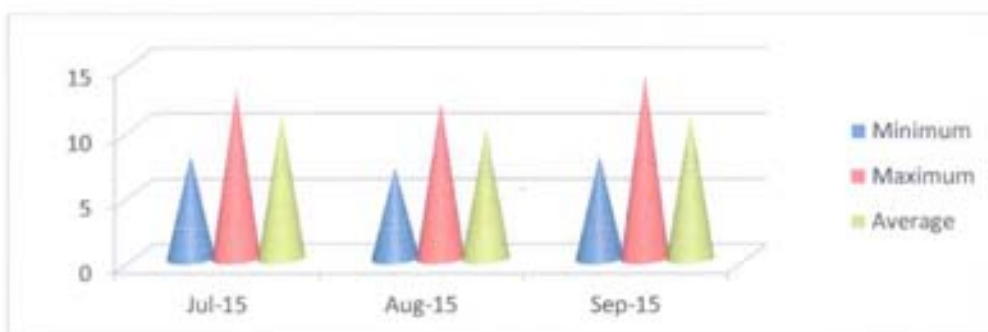
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of July 2015 to September 2015 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Sairaidh Campus

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.



Graph :- Sairaidh Campus



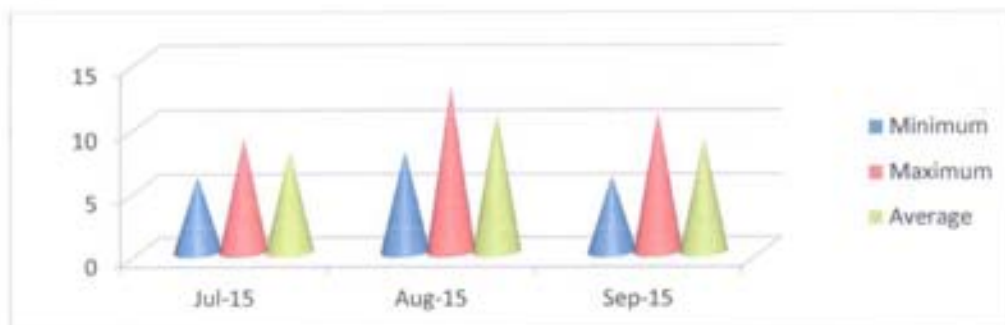


### New Kudag/Nr.Weigh Bridge

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 9 µg/m<sup>3</sup> respectively and average concentration of 8 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.



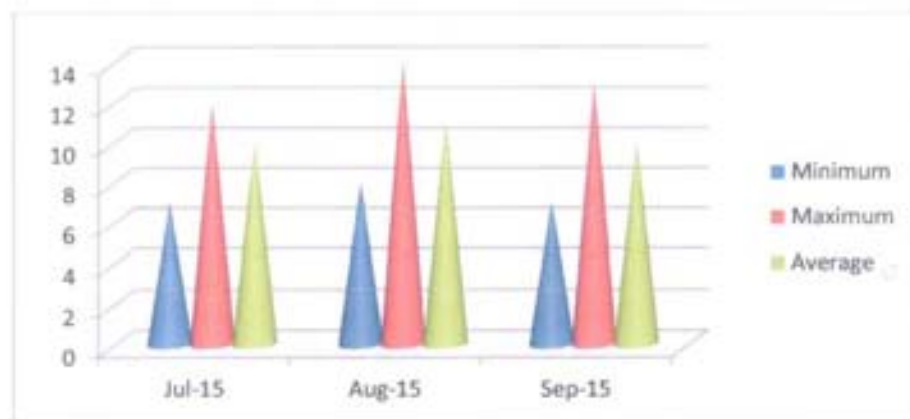
Graph:- New Kudag/Nr.Weigh Bridge

### Old Kudag/Mining Area

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.



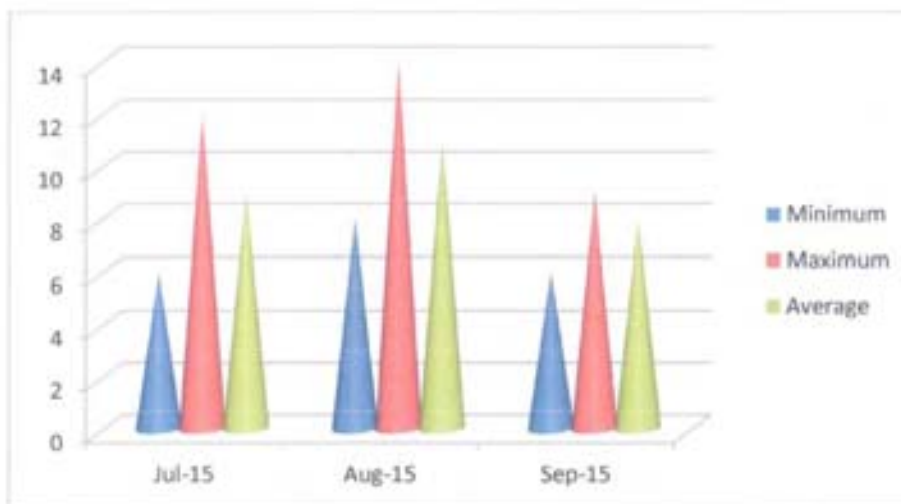
**Graph:- Old Kudag/Mining Area**

### Khas Kudag

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 9 µg/m<sup>3</sup> respectively and average concentration of 8 µg/m<sup>3</sup>.



Graph:- Khas Kudag

## 2.7 Fugitive Emission (Buffer Zone):-

### 2.7.1 Presentation of Results.

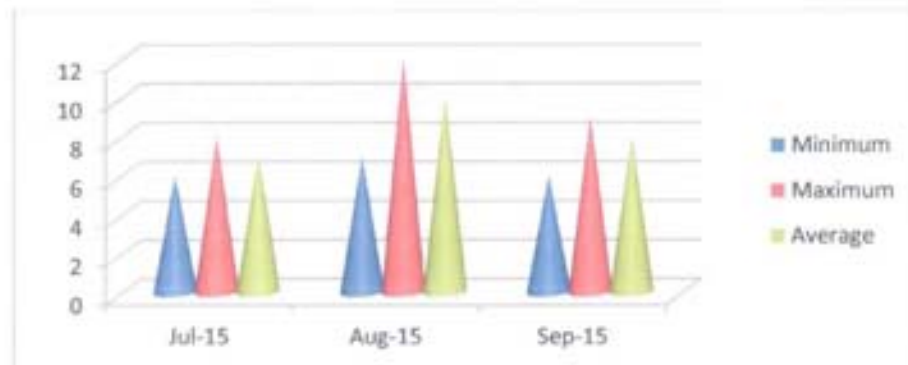
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of July 2015 to September 2015 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 8 µg/m<sup>3</sup> respectively and average concentration of 7 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 9 µg/m<sup>3</sup> respectively and average concentration of 8 µg/m<sup>3</sup>.



**Graph:- Jaljali Village**



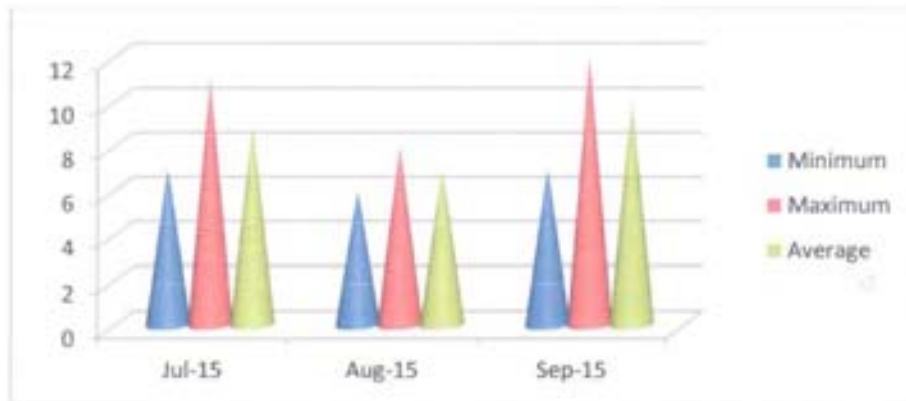


**Samri Chowk/Nr.Old Weigh Bridge**

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 8 µg/m<sup>3</sup> respectively and average concentration of 7 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.



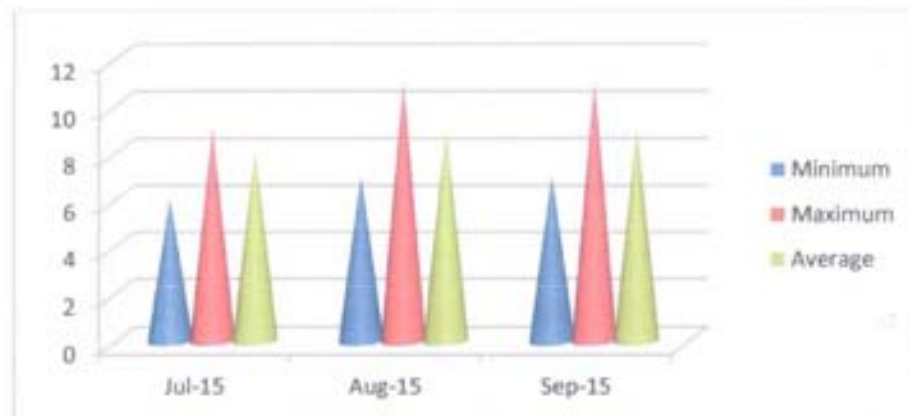
**Graph:- Samri Chowk/Nr.Old Weigh Bridge**

**Rajendrapur**

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 9 µg/m<sup>3</sup> respectively and average concentration of 8 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.



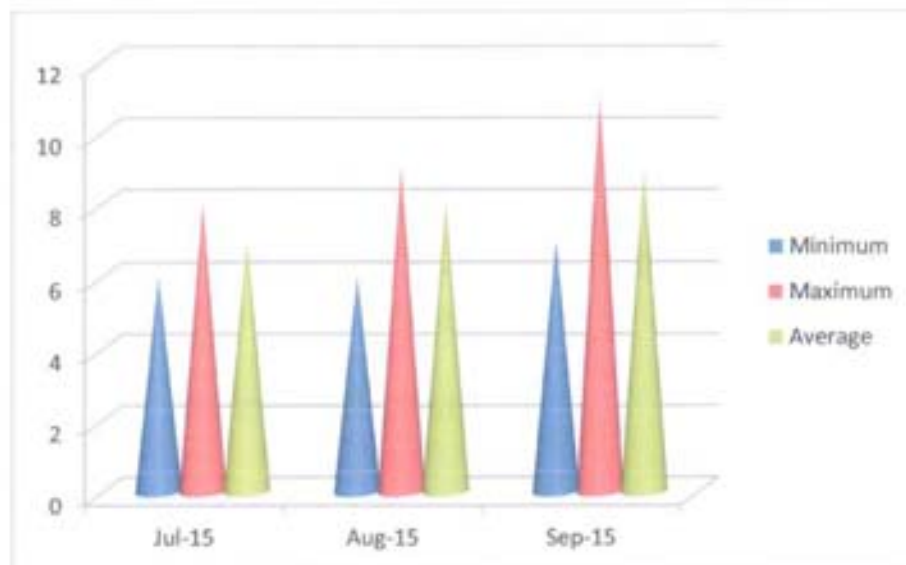
**Graph:- Rajendrapur**

### Tatijharia Village

For the month of July-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 8 µg/m<sup>3</sup> respectively and average concentration of 7 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 9 µg/m<sup>3</sup> respectively and average concentration of 8 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.



Graph:- Tatijharia Village



**Table 10**  
**Statistical Analysis of NOx**

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	July-2015	14	21	18	18	21
	August-2015	16	24	20	20	24
	September-2015	17	26	22	22	26
New Kudag/Nr. Weigh Bridge	July-2015	21	28	25	25	28
	August-2015	24	31	28	28	31
	September-2015	23	29	26	26	29
Old Kudag/Mining Area	July-2015	17	28	23	23	28
	August-2015	18	24	21	21	24
	September-2015	14	19	17	17	19
Khas Kudag	July-2015	21	28	25	25	28
	August-2015	18	24	21	21	24
	September-2015	21	31	26	26	31
<b>Buffer Zone :-</b>						
Jaljali Village	July-2015	12	18	15	15	18
	August-2015	14	21	18	18	21
	September-2015	12	16	14	14	16
Samri Chowk/ Nr.Old Weigh Bridge	July-2015	13	21	17	17	21
	August-2015	16	24	20	20	24
	September-2015	18	26	22	22	26
Rajendrapur	July-2015	17	21	19	19	21
	August-2015	16	19	18	18	19
	September-2015	17	23	20	20	23
Tatijharia Village	July-2015	14	16	15	15	16
	August-2015	16	19	18	18	19
	September-2015	17	21	19	19	21
<b>CPCB Standard</b>		<b>80 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

Note :- All the Values are in CPCB Limit.

**Fugitive Emission (Core Zone):-** (Average of NO<sub>x</sub> For the month of July-Aug-Sept-2015)

**Sairaidh Campus :-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 20  $\mu\text{g}/\text{m}^3$ .

**New Kudag/Nr. Weigh Bridge:-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 26  $\mu\text{g}/\text{m}^3$ .

**Old Kudag/Mining Area:-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 20  $\mu\text{g}/\text{m}^3$ .

**Khas Kudag:-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 24  $\mu\text{g}/\text{m}^3$ .

**Buffer Zone :-**

**Jaljali Village :-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 16  $\mu\text{g}/\text{m}^3$ .

**Samri Chowk :-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 20  $\mu\text{g}/\text{m}^3$ .

**Rajendrapur:-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 19  $\mu\text{g}/\text{m}^3$ .

**Tatijharia Village:-** For the Months of July-Aug-Sept-2015 Average of NO<sub>x</sub> is 17  $\mu\text{g}/\text{m}^3$ .



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

2.8 Fugitive Emission (Core Zone):-

2.8.1 Presentation of Results.

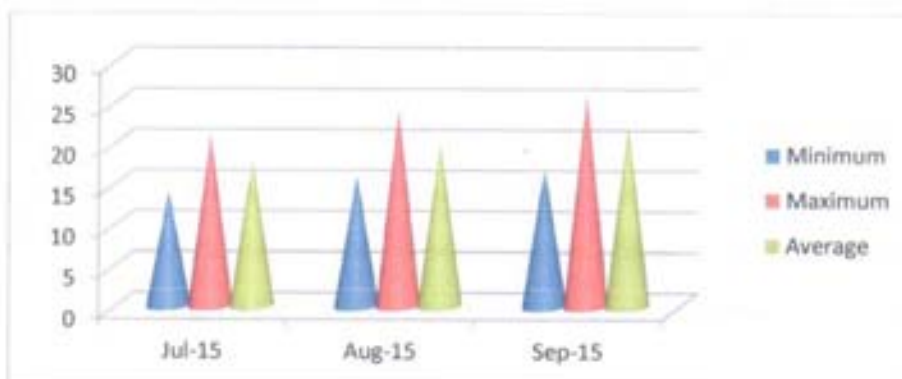
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of July 2015 to September 2015 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14 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 August-2015 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>.

For the month of September-2015 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>.



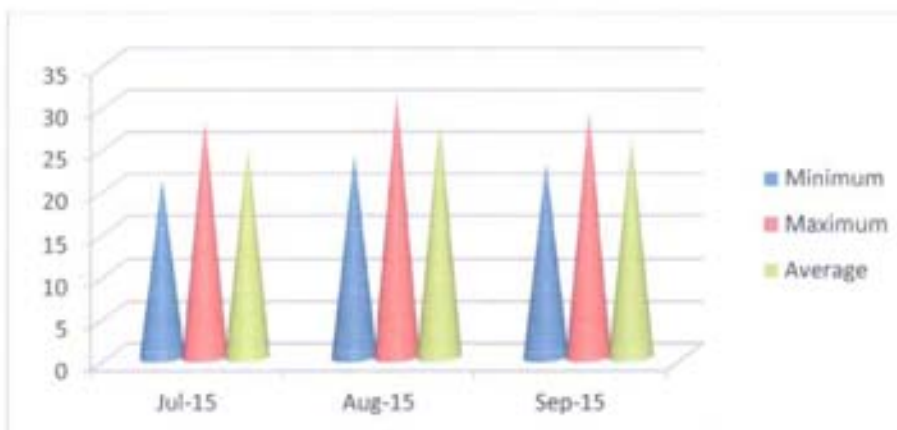
Graph :- Sairaidh Campus

### New Kudag/Nr.Weigh Bridge

For the month of July-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21 µg/m<sup>3</sup> and 28 µg/m<sup>3</sup> respectively and average concentration of 25 µg/m<sup>3</sup>.

For the month of August-2015 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 September-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 23 µg/m<sup>3</sup> and 29 µg/m<sup>3</sup> respectively and average concentration of 26 µg/m<sup>3</sup>.



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

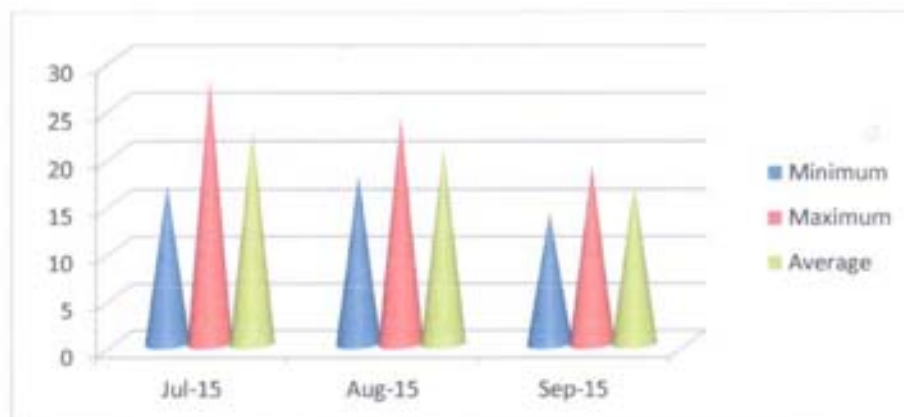


### Old Kudag/Mining Area

For the month of July-2015 the minimum and maximum concentrations for  $\text{NO}_x$  were recorded as  $17 \mu\text{g}/\text{m}^3$  and  $28 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $23 \mu\text{g}/\text{m}^3$ .

For the month of August-2015 the minimum and maximum concentrations for  $\text{NO}_x$  were recorded as  $18 \mu\text{g}/\text{m}^3$  and  $24 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $21 \mu\text{g}/\text{m}^3$ .

For the month of September-2015 the minimum and maximum concentrations for  $\text{NO}_x$  were recorded as  $14 \mu\text{g}/\text{m}^3$  and  $19 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $17 \mu\text{g}/\text{m}^3$ .



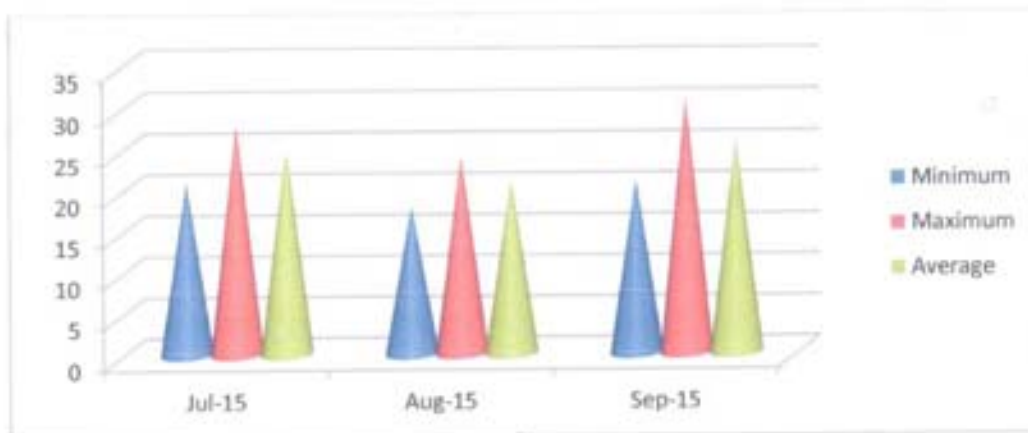
**Graph:- Old Kudag/Mining Area**

### Khas Kudag

For the month of July-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21 µg/m<sup>3</sup> and 28 µg/m<sup>3</sup> respectively and average concentration of 25 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 24 µg/m<sup>3</sup> respectively and average concentration of 21 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21 µg/m<sup>3</sup> and 31 µg/m<sup>3</sup> respectively and average concentration of 26 µg/m<sup>3</sup>.



**Graph:- Khas Kudag**



## 2.9 Fugitive Emission (Buffer Zone):-

### 2.9.1 Presentation of Results.

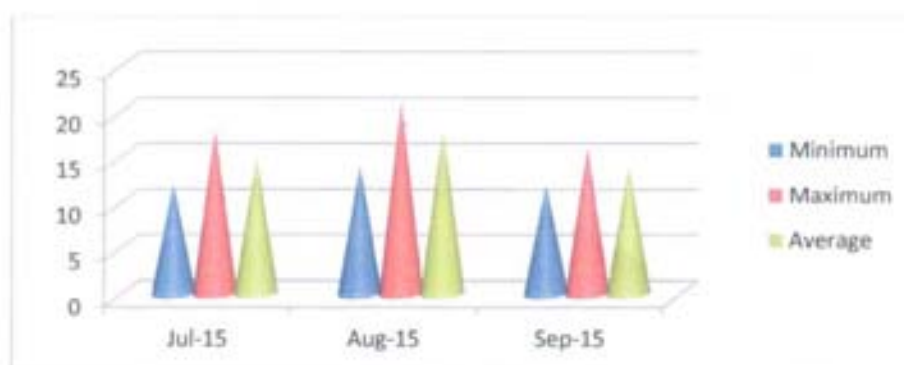
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of July 2015 to September 2015 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 12 µg/m<sup>3</sup> and 18 µg/m<sup>3</sup> respectively and average concentration of 15 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14 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 September-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 12 µg/m<sup>3</sup> and 16 µg/m<sup>3</sup> respectively and average concentration of 14 µg/m<sup>3</sup>.



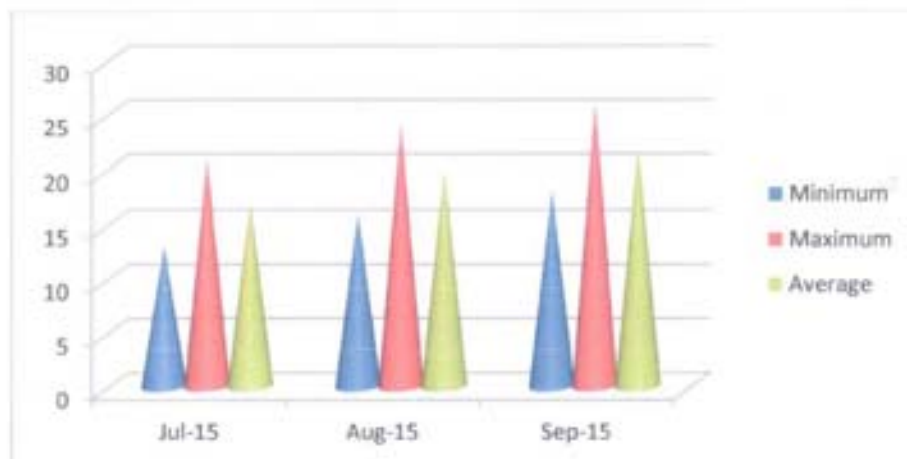
**Graph:- Jaljali Village**

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

For the month of July-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 13 µg/m<sup>3</sup> and 21 µg/m<sup>3</sup> respectively and average concentration of 17 µg/m<sup>3</sup>.

For the month of August-2015 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>.

For the month of September-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 26 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.



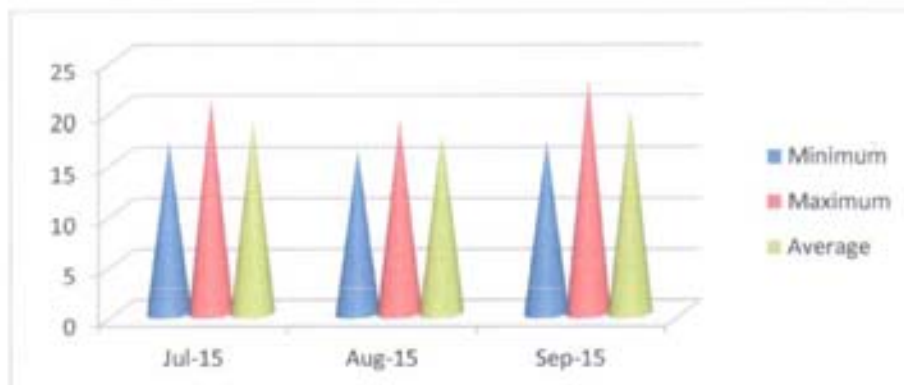
**Graph:- Samri Chowk/Nr.Old Weigh Bridge**

### Rajendrapur

For the month of July-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17 µg/m<sup>3</sup> and 21 µg/m<sup>3</sup> respectively and average concentration of 19 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16 µg/m<sup>3</sup> and 19 µg/m<sup>3</sup> respectively and average concentration of 18 µg/m<sup>3</sup>.

For the month of September-2015 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>.



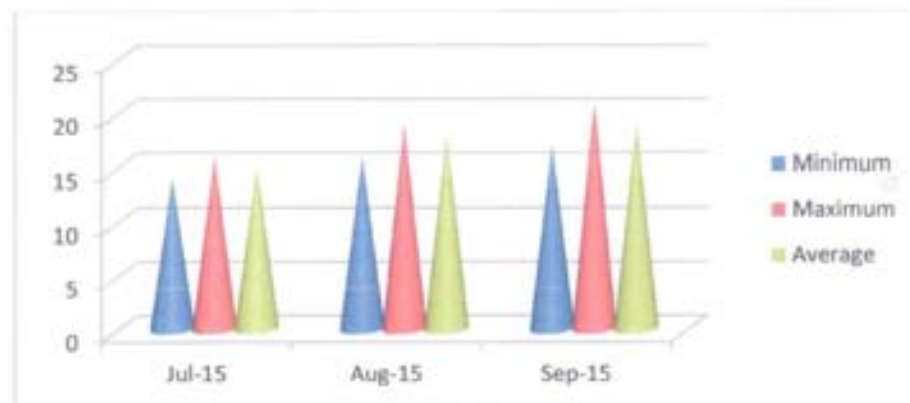
Graph:- Rajendrapur

### Tatijharia Village

For the month of July-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14 µg/m<sup>3</sup> and 16 µg/m<sup>3</sup> respectively and average concentration of 15 µg/m<sup>3</sup>.

For the month of August-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16 µg/m<sup>3</sup> and 19 µg/m<sup>3</sup> respectively and average concentration of 18 µg/m<sup>3</sup>.

For the month of September-2015 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17 µg/m<sup>3</sup> and 21 µg/m<sup>3</sup> respectively and average concentration of 19 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>	July-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	August-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	September-2015	<0.005	<0.005	<0.005	<0.005	<0.005
<b>New Kudag/Nr. Weigh Bridge</b>	July-2015	0.018	0.031	0.025	0.025	0.031
	August-2015	0.021	0.034	0.028	0.028	0.034
	September-2015	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Old Kudag/Mining Area</b>	July-2015	0.018	0.029	0.024	0.024	0.029
	August-2015	0.021	0.032	0.027	0.027	0.032
	September-2015	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Khas Kudag</b>	July-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	August-2015	0.018	0.021	0.020	0.020	0.021
	September-2015	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	July-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	August-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	September-2015	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	July-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	August-2015	0.021	0.028	0.025	0.025	0.028
	September-2015	0.019	0.024	0.022	0.022	0.024
<b>Rajendrapur</b>	July-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	August-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	September-2015	<0.005	<0.005	<0.005	<0.005	<0.005
<b>Tatijharia Village</b>	July-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	August-2015	<0.005	<0.005	<0.005	<0.005	<0.005
	September-2015	<0.005	<0.005	<0.005	<0.005	<0.005
<b>CPCB Standard</b>		<b>1.0 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

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



**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>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	September-2015	<0.01	<0.01	<0.01	<0.01	<0.01
<b>New Kudag/Nr. Weigh Bridge</b>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	0.018	0.024	0.021	0.021	0.024
	September-2015	0.016	0.021	0.019	0.019	0.021
<b>Old Kudag/Mining Area</b>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	0.016	0.024	0.020	0.020	0.024
	September-2015	0.018	0.029	0.024	0.024	0.029
<b>Khas Kudag</b>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	0.011	0.016	0.014	0.014	0.016
	September-2015	0.014	0.021	0.018	0.018	0.021
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	September-2015	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	September-2015	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Rajendrapur</b>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	September-2015	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Tatijharia Village</b>	July-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	August-2015	<0.01	<0.01	<0.01	<0.01	<0.01
	September-2015	<0.01	<0.01	<0.01	<0.01	<0.01



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

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>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>New Kudag/Nr. Weigh Bridge</b>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Old Kudag/Mining Area</b>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Khas Kudag</b>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Buffer Zone :-</b>						
<b>Jaljali Village</b>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Samri Chowk/ Nr.Old Weigh Bridge</b>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Rajendrapur</b>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>Tatijharia Village</b>	July-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	August-2015	<0.1	<0.1	<0.1	<0.1	<0.1
	September-2015	<0.1	<0.1	<0.1	<0.1	<0.1
<b>CPCB Standard</b>		<b>06 <math>\mu\text{g}/\text{m}^3</math> (Annual)</b>				

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





**Free Silica :-**

Sr. No.	Location	Measurement Unit	July-2015		August-2015		September-2015	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Old Kudag/Mining Area	g/100gm	0.13	0.06	0.18	0.11	0.16	0.08

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

Sl.No.	Location	July-2015	August-2015	September-2015	Average
<b>Rate (mt/km<sup>2</sup>/month)</b>					
1	Old Kudag/Mining Area	19.3	23.7	21.9	<b>21.6</b>
2	Khas kudag	14.8	17.3	19.6	<b>17.2</b>

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

Sl. No.	Location	Unit: dB(A) Leq					
		July-2015		August-2015		September-2015	
		Day	Night	Day	Night	Day	Night
<b>Core Zone</b>							
1	Sairaidh Campus	61.9	52.8	57.3	48.2	56.1	43.9
2	New Kudag/Near Weigh Bridge	64.7	58.2	61.8	54.7	59.2	52.8
3	Old Kudag/Mining Area	57.3	43.7	52.9	46.1	48.9	41.6
4	Khas Kudag	62.8	57.1	58.3	52.8	61.7	53.9
<b>Buffer Zone</b>							
1	Jaljali Village	46.3	37.2	51.9	42.8	48.3	38.7
2	Samri Chowk/Nr.Old Weigh Bridge	51.6	41.9	49.2	37.1	46.2	36.9
3	Rajendrapur	52.8	42.7	47.6	37.9	51.4	41.6
4	Tatijharia Village	47.2	39.2	52.4	38.7	47.7	37.3

**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	July-2015			August-2015			September-2015		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	New Kudag/Nr.Weigh Bridge	68.2	82.9	<b>75.6</b>	67.3	81.4	<b>74.4</b>	68.7	83.1	<b>75.9</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-September-2015**

**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	7.18 at 26°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.4
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)	0.3	No relaxation	0.19
7.	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	Min. 1	< 0.1
8.	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000	341
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.16
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	57.29
12.	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 23)	200	600	104.38
13.	Total hardness (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 21)	200	600	180.75
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	62.89
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	5.73
16.	Sulphate (as SO <sub>4</sub> )	mg/l	IS 3025 (Part 24)	200	400	42.17
17.	Nitrate (as NO <sub>3</sub> )	mg/l	APHA Method	45	No relaxation	< 2
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	0.05	< 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	0.18
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	0.05
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.....



(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	USEPA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.06	No relaxation	Absent
	d. Chloroform			0.2	No relaxation	Absent
39.	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	IS 3025 (Part 43) : 1001	0.001	0.002	< 0.001
40.	Anionic detergents (as MBAS)	mg/l	IS 13428 2005 (Annex K)	0.2	1.0	< 0.001
41.	Polynuclear aromatic hydrocarbon (PAH)	µg/l	USEPA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	Absent	Absent	< 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	USEPA 508	0.01		Absent
ii.	Beta HCH	µg/l	USEPA 508	0.04		Absent
iii.	Delta- HCH	µg/l	USEPA 508	0.04		Absent
iv.	Alachlor	µg/l	USEPA 508	20		Absent
v.	Aldrin / Dieldrin	µg/l	USEPA 508	0.03		Absent
vi.	Atrazine	µg/l	USEPA 1657	2		Absent
vii.	Butachlor	µg/l	USEPA 508	125		Absent
viii.	Chlorpyrifos	µg/l	USEPA 1657	30		Absent
ix.	DDT and its isomers	µg/l	USEPA 508	1		Absent
x.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2		Absent
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30		Absent
xii.	Endosulphan	µg/l	USEPA 508	0.4		Absent
xiii.	Ethion	µg/l	USEPA 1657	3		Absent
xiv.	Isoproturon	µg/l	USEPA 1657	9		Absent
xv.	Malathion	µg/l	USEPA 1657	190		Absent
xvi.	Methyl Parathion	µg/l	USEPA 1657	0.3		Absent
xvii.	Monocrotophos	µg/l	USEPA 1657	1		Absent
xviii.	Phorate	µg/l	USEPA 1657	2		Absent

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

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





**Table 17**  
**Monthly Report on Chemical Examination of Surface Water**  
**(Nalags near Mining Area)**  
**September-2015**

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	8.02 at 26°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	9
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	7.1
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)	0.3	No relaxation	0.26
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	419
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	< 0.005
11.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000	112.54
12.	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 23)	200	600	138.47
13.	Total hardness (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 21)	200	600	242.81
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	76.17
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 48)	30	100	12.76
16.	Sulphate (as SO <sub>4</sub> )	mg/l	IS 3025 (Part 24)	200	400	119.27
17.	Nitrate (as NO <sub>3</sub> )	mg/l	APHA Method	45	No relaxation	8.1
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	0.05	< 0.01
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	0.018
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	0.26
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	0.07
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.....





(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	USEPA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.05	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	USEPA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	Absent	Absent	>16
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	USEPA 508	0.01		Absent
ii.	Beta HCH	µg/l	USEPA 508	0.04		Absent
iii.	Delta- HCH	µg/l	USEPA 508	0.04		Absent
iv.	Alachlor	µg/l	USEPA 508	20		Absent
v.	Aldrin / Dieldrin	µg/l	USEPA 508	0.03		Absent
vi.	Atrazine	µg/l	USEPA 1657	2		Absent
vii.	Butachlor	µg/l	USEPA 508	125		Absent
viii.	Chlorpyrifos	µg/l	USEPA 1657	30		Absent
ix.	DDT and its isomers	µg/l	USEPA 508	1		Absent
x.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2		Absent
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30		Absent
xii.	Endosulphan	µg/l	USEPA 508	0.4		Absent
xiii.	Ethion	µg/l	USEPA 1657	3		Absent
xiv.	Isoproturon	µg/l	USEPA 1657	9		Absent
xv.	Malathion	µg/l	USEPA 1657	190		Absent
xvi.	Methyl Parathion	µg/l	USEPA 1657	0.3		Absent
xvii.	Monocrotophos	µg/l	USEPA 1657	1		Absent
xviii.	Phorate	µg/l	USEPA 1657	2		Absent

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

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



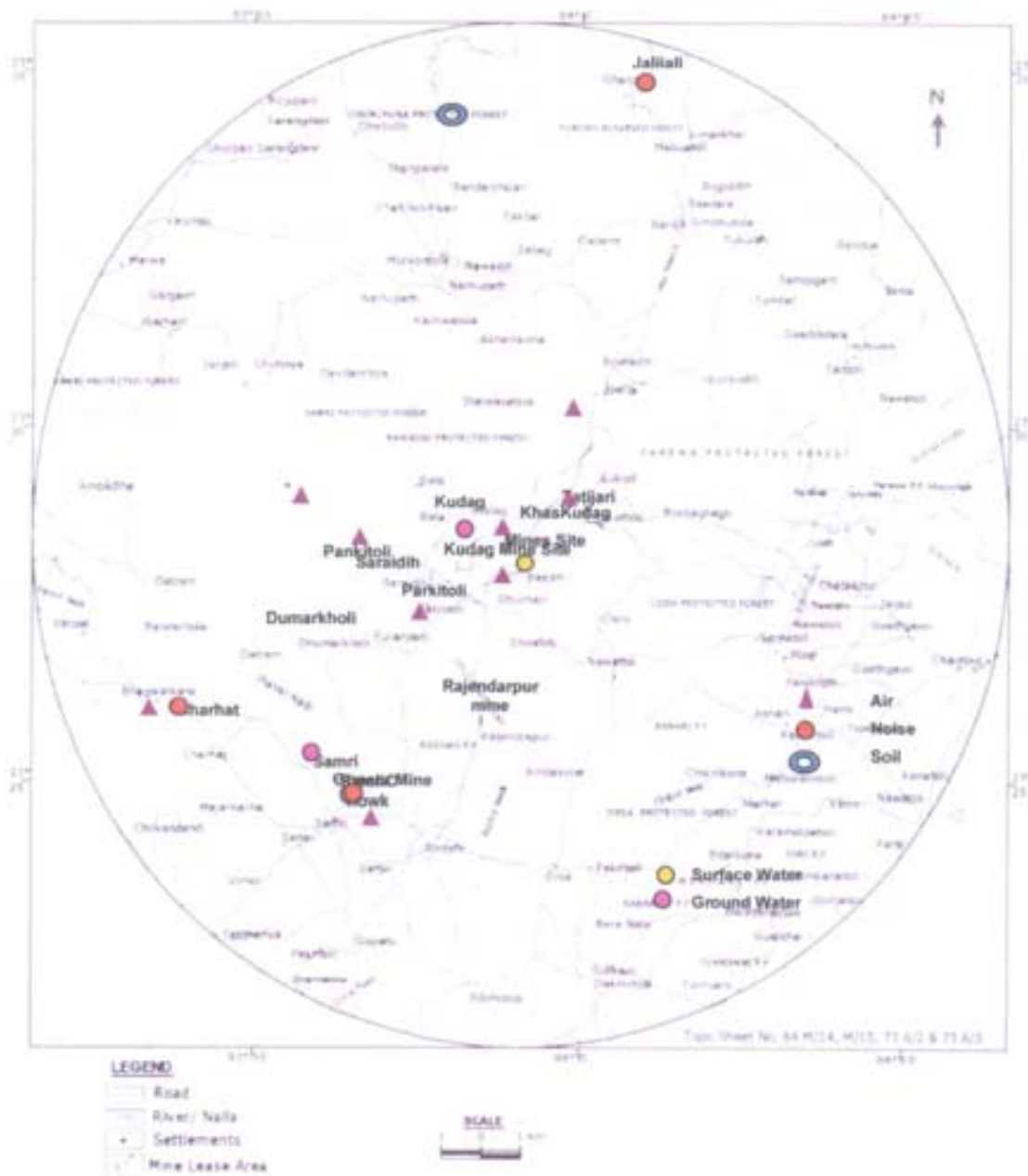
**Table 18**

**Report on Soil Analysis, Kudag**  
**Date of collection: September-2015**  
**Sample Location:(Old Kudag/Mining Area)**

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/Mining Area
1.	P <sup>H</sup> (1:5 water extract)	-	6.82 at 26°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	186
3.	Texture	-	Silty Clay
4.	Sand	%	24
5.	Slit	%	43
6.	Clay	%	33
7.	Water Holding Capacity	%	48.19
8.	Bulk Density	g/cc	1.18
9.	Porosity	%	26.57
10.	Exchangeable Calcium (as Ca)	mg/Kg	117.29
11.	Exchangeable Magnesium (as Mg)	mg/Kg	13.56
12.	Exchangeable Manganese (as Mn)	mg/Kg	3.92
13.	Exchangeable Zinc (as Zn)	mg/Kg	1.16
14.	Available Boron (as B)	mg/Kg	0.29
15.	Water Soluble Chloride (as Cl <sup>-</sup> )	mg/Kg	194.58
16.	Water Soluble Sulphate (as SO <sub>4</sub> )	mg/Kg	112.37
17.	Available Potassium (as K)	mg/Kg	81.29
18.	Available Phosphorous (as P)	Kg/hect	1.72
19.	Available Nitrogen (as N)	Kg/hect	119
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	0.26
24.	Total Iron	mg/Kg	4.12
25.	Organic Matter	g/100g	1.94
26.	Organic Carbon	g/100g	1.03
27.	CEC	meq/100g	11.6

**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**