

Environmental Status Report
For
Samri 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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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 Aluminium.

Various processing units of HINDALCO are strategically located in different parts of the nation to achieve optimum benefits. Over the past few decades the group has grown multifold in its production capacities, product mix and diversification in mining. HINDALCO possesses bauxite mine leases of Kudag, Samri and Tatijharia mines in Balrampur district of Chhattisgarh State.

HINDALCO INDUSTRIES LTD. awarded the work to M/s ANACON LABORATORIES PVT. LTD. Nagpur (ALPL) for carrying out Environmental monitoring of parameters for assessing pollution levels and preparation of monthly report (July, August & September-2015) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment and Forest (MoEF) for Samri mining leases in Balrampur District, Chhattisgarh State.

1.2 Background Information of Samri Mine

HINDALCO was granted Samri Bauxite mining lease over an area of 2146.746 hec in Samri, Dumarkholi, Gopatu villages in Post Office & Tehsil Samri (Kusmi) of Balrampur district, Chhattisgarh on 24/06/1998 for a period of 20 years. The mining operations were started on 25/05/1999. The production capacity of Bauxite is 5.0 Lakh Tonnes Per Annum (LTPA).

1.3 Salient Features of Samri Bauxite Mine

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



Table 1

Salient Features of Samri Bauxite Mines

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

1.4 Environmental Monitoring

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

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



1.5 Air Environment

1.5.1 Ambient Air Quality Monitoring

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

Table 2

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

S.No.	Core zone	Sr. No.	Buffer zone
1	Samri-Gopatu/Near Weigh Bridge	5	Sairaidh Campus
2	Rajendrapur/Near Mining Area	6	Jaljali Village
3	Kutku Village/Near V.T.Center	7	Tatijharia Village/Near Weigh Bridge
4	Dumerkholi/Near Mining Area	8	Piprapat/Near Mining Area

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the mining site in the core zone and buffer zone. Anacon Laboratories Pvt. Ltd., Nagpur is carrying out regular monitoring for PM_{2.5}, RPM(PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, 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 Samri chowk during July-August-September-2015. The AAQM and Fugitive Emission sampling sites are selected considering seasonal variation in wind speed and wind direction.

Sampling Duration and Frequency

Ambient air quality monitoring and Fugitive Emission monitoring was carried out for the parameters PM_{2.5}, RPM (PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, NO_x, Pb, Hg, As and Cr, from July-August-September-2015 as per CPCB norms. Sampling Duration and Frequency is given in (Table 3).

Data is compared with the present revised standards mentioned in the latest Gazette Notification of the Central Pollution Control Board (CPCB) 18th November, 2009 and as per consent conditions mentioned in consent letter.



MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

Methods and Instruments used for Sampling

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

The levels of Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), 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 m³/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-Gopatu during pre and post monsoon period. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (0.02 N 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-PM₁₀, Particulate Matter-PM_{2.5}, SO₂ and NO_x 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 (PM₁₀), Particulate Matter (PM_{2.5}), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Lead (Pb), Mercury (Hg), Arsenic (As) and Chromium (Cr). **Table-3.0**



Table-3.0

Parameters	Sampling frequency
Suspended Particulate Matter	24 hourly sample twice a week for Three months
Respirable Particulate Matter	24 hourly sample twice a week for Three months
Particulate Matter 2.5	24 hourly sample twice a week for Three months
Sulphur dioxide (SO ₂)	24 hourly sample twice a week for Three months
Oxides of Nitrogen (NO _x)	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/ m³)
1.	Suspended Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
2.	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
3.	Particulate Matter 2.5	Respirable Dust Sampler (Gravimetric Method)	Gravimetric Method	5
4.	Sulphur Dioxide	Modified West and Gaeke	IS-5182 (Part - II)	4
5.	Oxide of Nitrogen	Jacob & Hochheiser Method	IS-5182 (Part - VI)	4
6.	Pb, As, Hg, Cr	Acid Digestion Method	EPA Method	0.1
7.	Dust Full	Gravimetric	IS-5182 (Part-I)	-

1.6 Fugitive Emission Monitoring

The summary of Fugitive Emission monitoring results for the month of July-August-September-2015 are presented in detail in **Table 6.0**. 98th 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.

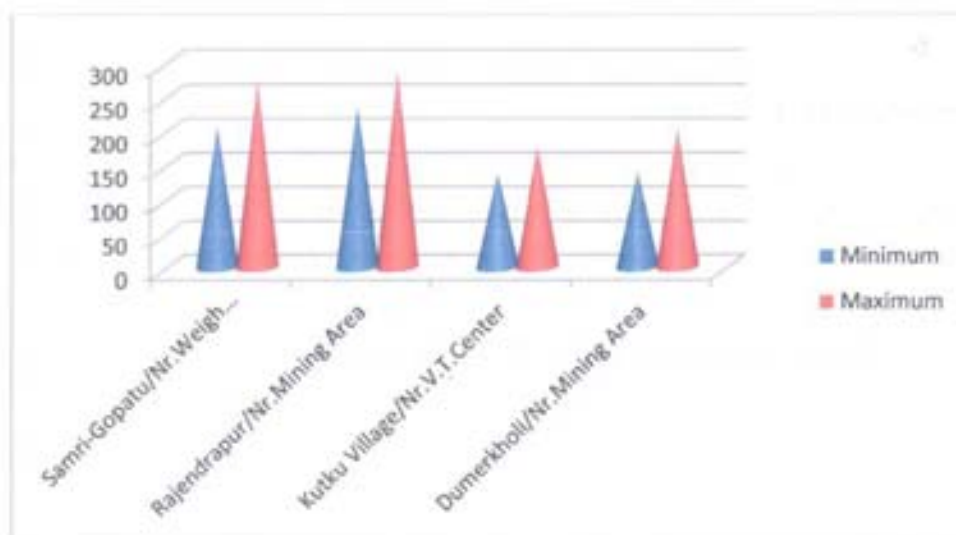
1.6.1 Presentation of Results.

Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 139 $\mu\text{g}/\text{m}^3$ and 287 $\mu\text{g}/\text{m}^3$ respectively. The average concentrations were ranged between 146 to 264 $\mu\text{g}/\text{m}^3$. and 98th percentile values ranged between 152 to 286 $\mu\text{g}/\text{m}^3$ in the study area (**Table 6**).

Graphical Presentation Of Fugitive Emission Monitoring

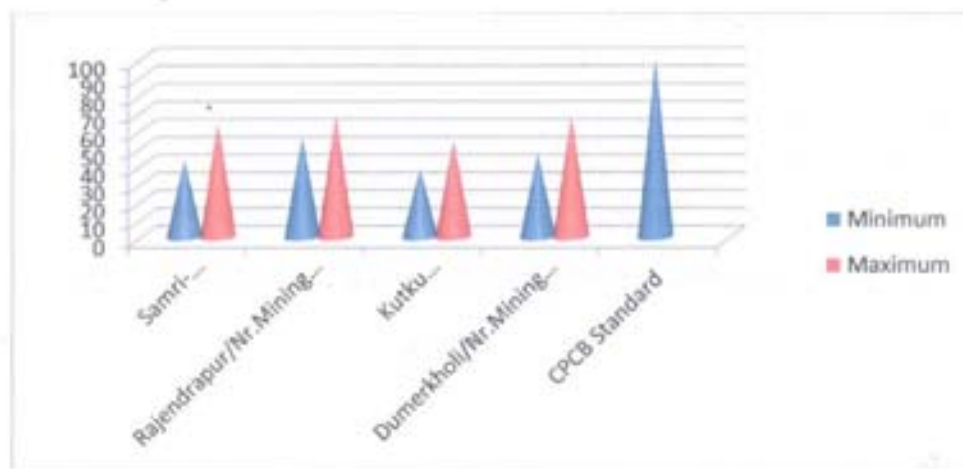
SPM



Respirable Suspended Particulate Matter –RSPM

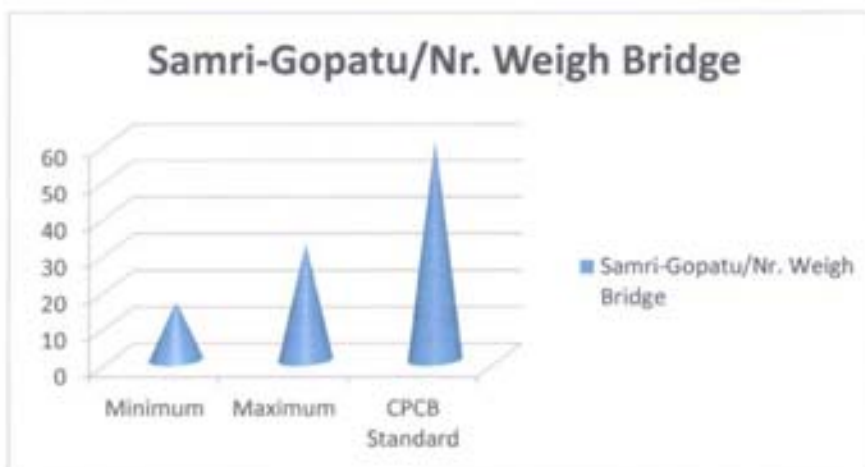
The minimum and maximum concentrations for RSPM were recorded as 38 $\mu\text{g}/\text{m}^3$ and 68 $\mu\text{g}/\text{m}^3$ respectively. The average values were observed to be in the range of 40 to 65 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 41 to 68 $\mu\text{g}/\text{m}^3$ in the study area (**Table 7**).

Graphical Presentation Of Fugitive Emission Monitoring RSPM



Particulate Matter -PM_{2.5}

The minimum and maximum values of PM_{2.5} concentrations varied between 16 to 32 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 19 to 27 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 21 to 32 $\mu\text{g}/\text{m}^3$ (**Table 8**).

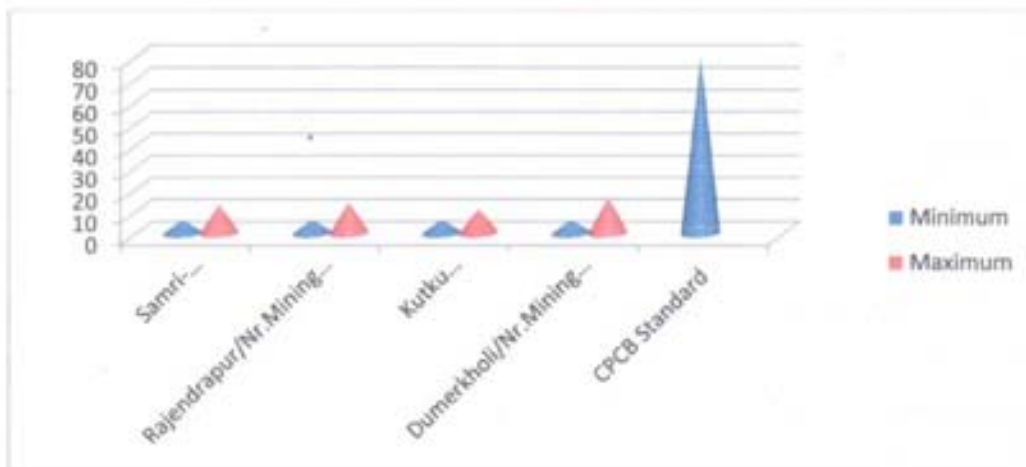


Sulphur Dioxide (SO₂)

The minimum and maximum SO₂ concentrations were recorded as 6 µg/m³ and 16 µg/m³ respectively. The average values were observed to be in the range of 7 to 13 µg/m³ and 98th percentile values varied between 8 to 16 µg/m³ (Table 9).

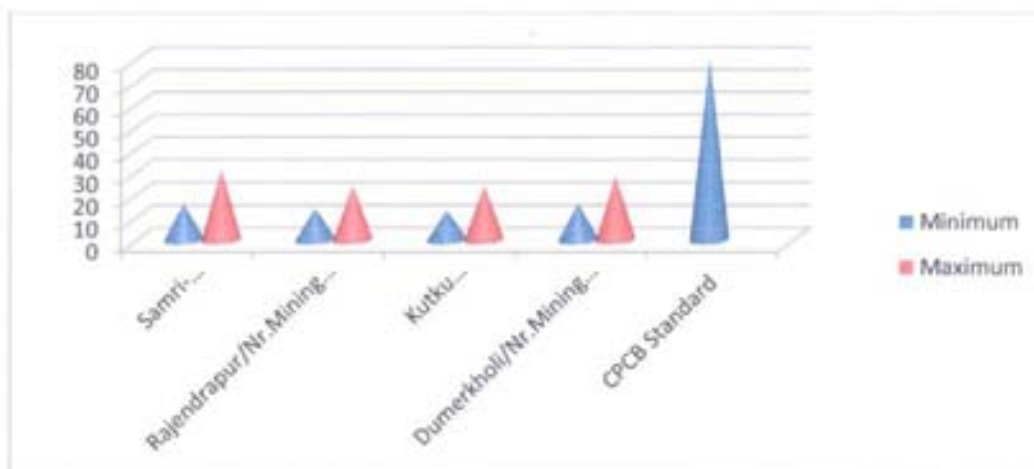
Graphical Presentation Of Fugitive Emission Monitoring

SO₂



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 14 µg/m³ and 31 µg/m³. The average concentrations were ranged between 15 to 26 µg/m³ and 98th percentile values varied between 17 to 31 µg/m³ (Table 10).





Lead (Pb)

The minimum and maximum Lead detected between <0.005 to $0.041 \mu\text{g}/\text{m}^3$ respectively. The average Lead detected between <0.005 to $0.035 \mu\text{g}/\text{m}^3$ & 98th percentile values varied between <0.005 to $0.041 \mu\text{g}/\text{m}^3$ in the study region. **(Table 11).**

Mercury (Hg)

The maximum concentrations of Hg varied $0.037 \mu\text{g}/\text{m}^3$ respectively. The average concentration varied $0.029 \mu\text{g}/\text{m}^3$ 98th percentiles values varied $0.037 \mu\text{g}/\text{m}^3$ in the study region. **(Table 12).**

Arsenic (As)

The maximum concentrations of As varied $0.43 \mu\text{g}/\text{m}^3$ respectively. The average concentration varied $0.34 \mu\text{g}/\text{m}^3$ and 98th percentiles values varied $0.43 \mu\text{g}/\text{m}^3$ in the study region **(Table 13).**

Chromium (Cr)

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

1.7 Ambient Air Quality (Buffer Zone)

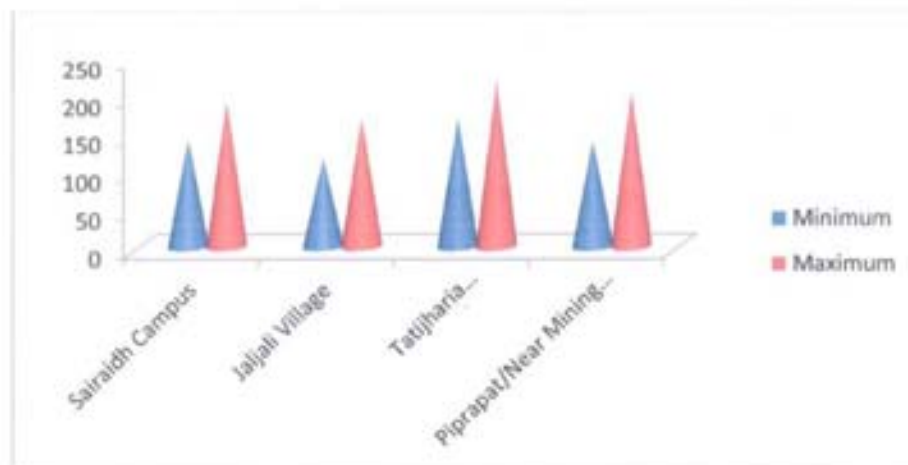
The background levels of SPM, RPM (PM_{10}), $PM_{2.5}$, SO_2 , NO_x , Pb, Hg, As and Cr measured are required to compute Ambient Air Quality. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, Maximum concentration, Arithmetic mean (AM), Geometric mean (GM) and 98 Percentile are presented in tabular form (**Table 6**).

1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month of July-August-September-2015 are presented in detail in **Table 3**. 98th percentile; maximum and minimum values etc have been computed from the collected raw data for all the AAQ monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQ for residential and rural zone.

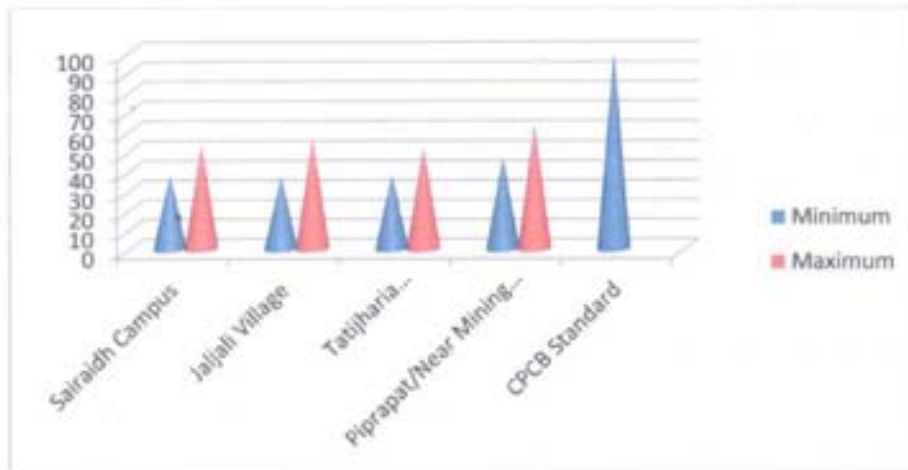
Suspended Particulate Matter-SPM

The statistical analysis of SPM is presented in **Table 6** for the mining area. The minimum and maximum values varied between 117 to 218 $\mu g/m^3$ respectively during study period at all the 4 locations. The average values ranged between 128 to 195 $\mu g/m^3$ and 98th percentile values ranged between 139 to 217 $\mu g/m^3$ in the study area.



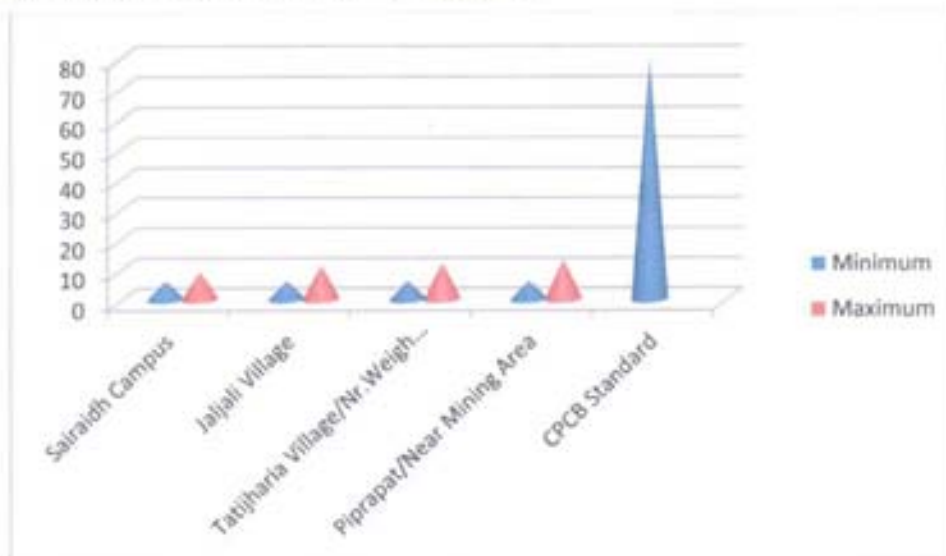
Particulate Matter-RSPM

The minimum and maximum values of RSPM varied between 37 to 63 $\mu\text{g}/\text{m}^3$ respectively (**Table 7**). The average values varied between 39 to 58 $\mu\text{g}/\text{m}^3$. The 98th percentile values varied between 41 to 63 $\mu\text{g}/\text{m}^3$ in the mining area. The overall values of SPM and RSPM were well within the CPCB limits prescribe for industrial and residential area in the study area during the study period.



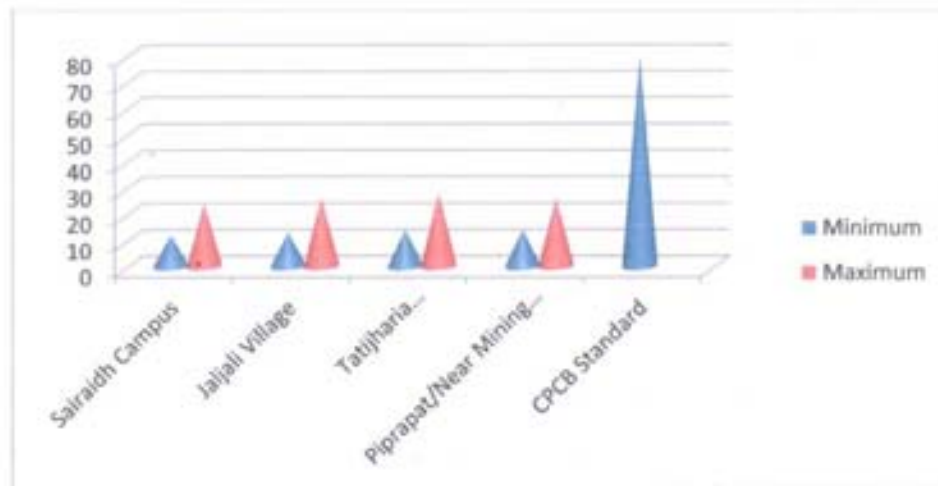
Sulphur Dioxide (SO₂)

The minimum and maximum values of SO₂ concentrations varied between 6 to 13 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 7 to 11 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 8 to 13 $\mu\text{g}/\text{m}^3$ (**Table 9**).



Nitrogen Oxide (NO_x)

The minimum and maximum values of NO_x concentrations varied between 12 to 28 µg/m³ respectively. The average values range between 15 to 22 µg/m³ and 98th percentile values varied between 18 to 28 µg/m³ (**Table 10**).



Lead (Pb)

The minimum and maximum Lead detected between <0.005 to 0.038 µg/m³ respectively. The average Lead detected between <0.005 to 0.031 µg/m³ and 98th percentile values varied between <0.005 to 0.038 µg/m³ in the study region

(**Table 11**).

Mercury (Hg)

The maximum concentrations of Hg varied 0.024 µg/m³ respectively. The average concentration varied 0.021 µg/m³ 98th percentiles values varied 0.024 µg/m³ in the study region.

(**Table 12**).



Arsenic (As)

The maximum concentrations of As varied $0.23 \mu\text{g}/\text{m}^3$ respectively. The average concentration varied $0.20 \mu\text{g}/\text{m}^3$ and 98th percentiles values varied $0.23 \mu\text{g}/\text{m}^3$ in the study region

(Table 13).

Chromium (Cr)

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

The dust fall rate was measured by exposing a jar during July-August-September- 2015 in Rajendrapur/Nr.Mining Area and Samri-Gopatu/Nr.Weigh Bridge. The dust fall rate was observed to be 27.08 and 22.34 $\text{MT}/\text{km}^2/\text{month}$ respectively as given in **(Table 14)**.

Overall the ambient air concentrations of SPM, RSPM, SO_2 , NO_x , Pb, Hg, As, Cr and Dust fall were well within the limits of concentrations promulgated by CPCB, New Delhi in the study area.



1.8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (July-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%

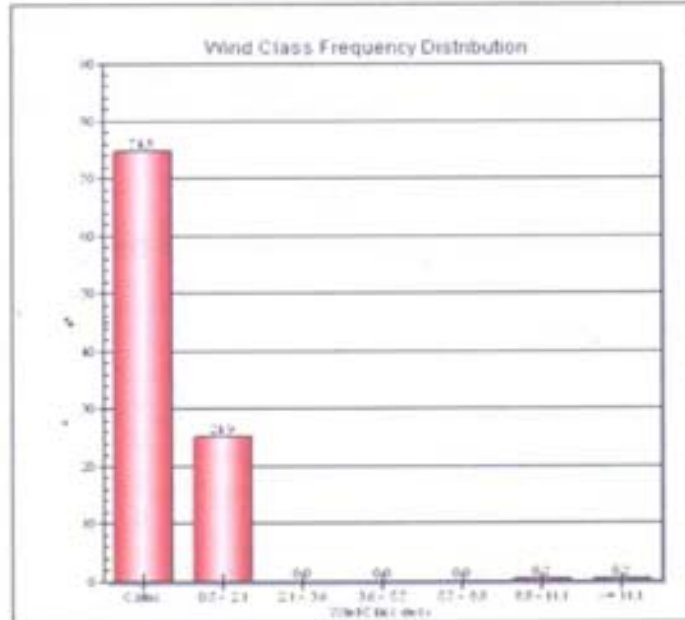


Figure.01: Wind Class Frequency Distribution



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

Identification of sampling locations

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

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

Instrument used for monitoring

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



Method of Monitoring

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

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

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

2.0 Water Quality

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



Table 6

Statistical Analysis of SPM

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	July-2015	207	249	228	228	248
	August-2015	218	257	238	238	256
	September-2015	229	273	251	251	272
Rajendrapur/ Nr.Mining Area	July-2015	238	281	260	260	280
	August-2015	241	287	264	264	286
	September-2015	237	264	251	251	263
Kutku Village/ Nr.V.T. Center	July-2015	139	152	146	146	152
	August-2015	141	163	152	152	163
	September-2015	162	178	170	170	178
Dumerkholi/ Nr.Mining Area	July-2015	142	191	167	167	190
	August-2015	154	204	179	179	203
	September-2015	149	183	166	166	182
Buffer Zone :-						
Sairaidh Campus	July-2015	154	173	164	164	173
	August-2015	167	192	180	180	192
	September-2015	142	167	155	155	167
Jaljali Village	July-2015	117	139	128	128	139
	August-2015	138	152	145	145	152
	September-2015	143	169	156	156	168
Tatijharia Village/ Nr. Weigh bridge	July-2015	172	204	188	188	203
	August-2015	169	196	183	183	195
	September-2015	171	218	195	195	217
Piprapat/ Nr.Mining Area	July-2015	173	204	189	189	203
	August-2015	164	193	179	179	192
	September-2015	139	168	154	154	167

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

Samri-Gopatu/ Nr.weigh bridge: For the Months of July-Aug-Sept-2015 Average of SPM is $239 \mu\text{g}/\text{m}^3$.

Rajendrapur/Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of SPM is $258 \mu\text{g}/\text{m}^3$.

Kutku Village / Nr.V.T. Center:- For the Months of July-Aug-Sept-2015 Average of SPM is $156 \mu\text{g}/\text{m}^3$.

Dumerkholi/ Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of SPM is $171 \mu\text{g}/\text{m}^3$.

Buffer Zone :-

Sairaidh Campus:- For the Months of July-Aug-Sept-2015 Average of SPM is $166 \mu\text{g}/\text{m}^3$.

Jaljali Village:- For the Months of July-Aug-Sept-2015 Average of SPM is $143 \mu\text{g}/\text{m}^3$.

Tatijharia Village/ Nr. Weigh bridge:- For the Months of July-Aug-Sept-2015 Average of SPM is $189 \mu\text{g}/\text{m}^3$.

Piprapat/ Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of SPM is $174 \mu\text{g}/\text{m}^3$.

Monthwise Summary of Statistical Analysis of SPM

3.0 Fugitive Emission (Core Zone):-

3.0.1 Presentation of Results.

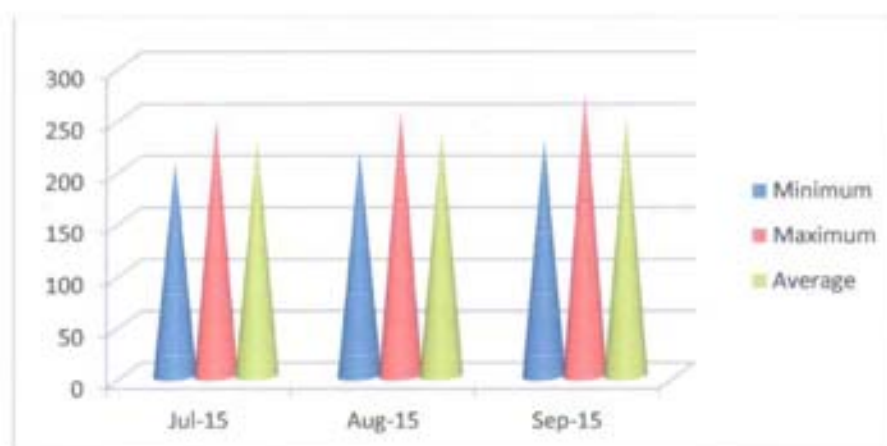
The summary of Statistical Analysis of SPM results for the month of July 2015 to September 2015 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as 207 $\mu\text{g}/\text{m}^3$ and 249 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 228 $\mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as 218 $\mu\text{g}/\text{m}^3$ and 257 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 238 $\mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as 229 $\mu\text{g}/\text{m}^3$ and 273 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 251 $\mu\text{g}/\text{m}^3$.



Graph :- Samri-Gopatu/ Nr.weigh bridge

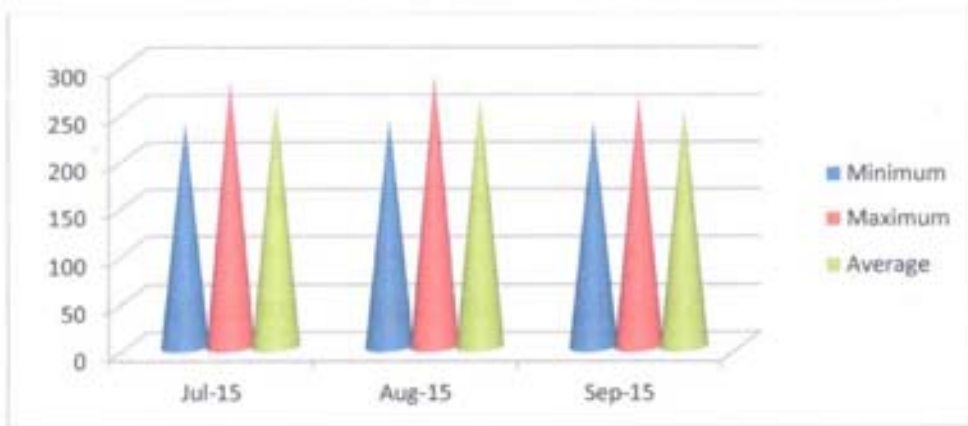


Rajendrapur/ Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as 238 $\mu\text{g}/\text{m}^3$ and 281 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 260 $\mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as 241 $\mu\text{g}/\text{m}^3$ and 287 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 264 $\mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as 237 $\mu\text{g}/\text{m}^3$ and 264 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 251 $\mu\text{g}/\text{m}^3$.



Graph:- Rajendrapur/ Nr.Mining Area

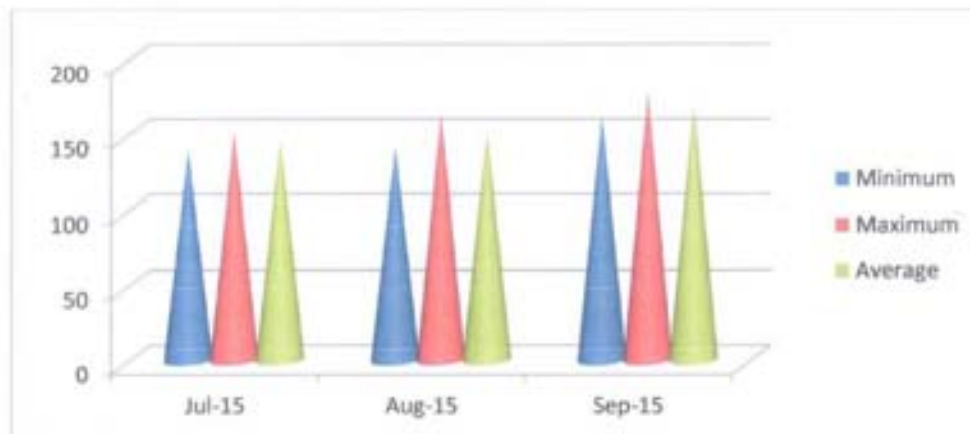


Kutku Village/ Nr.V.T. Center

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as $139 \mu\text{g}/\text{m}^3$ and $152 \mu\text{g}/\text{m}^3$ respectively and average concentration of $146 \mu\text{g}/\text{m}^3$.

For the month of August-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 September-2015 the minimum and maximum concentrations for SPM were recorded as $162 \mu\text{g}/\text{m}^3$ and $178 \mu\text{g}/\text{m}^3$ respectively and average concentration of $170 \mu\text{g}/\text{m}^3$.



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

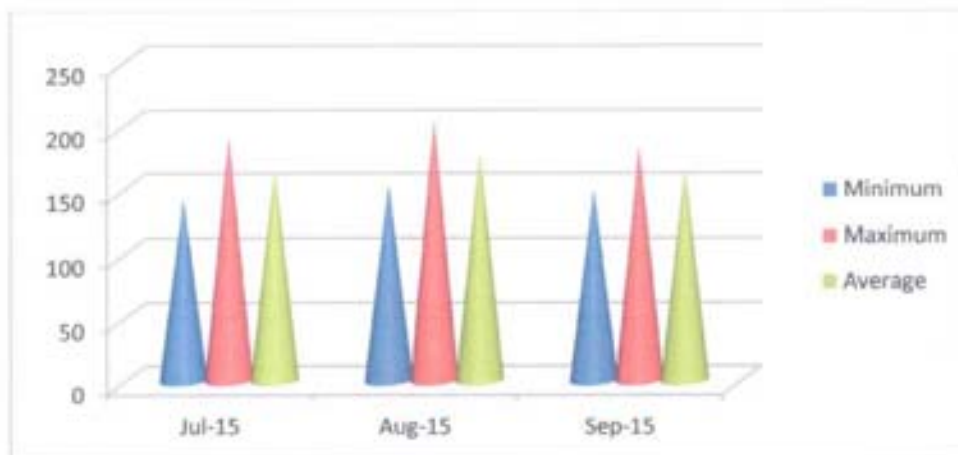


Dumerkholi/ Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as 142 $\mu\text{g}/\text{m}^3$ and 191 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 167 $\mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as 154 $\mu\text{g}/\text{m}^3$ and 204 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 179 $\mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as 149 $\mu\text{g}/\text{m}^3$ and 183 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 166 $\mu\text{g}/\text{m}^3$.



Graph:- Dumerkholi/ Nr.Mining Area



3.1 Fugitive Emission (Buffer Zone):-

3.1.1 Presentation of Results.

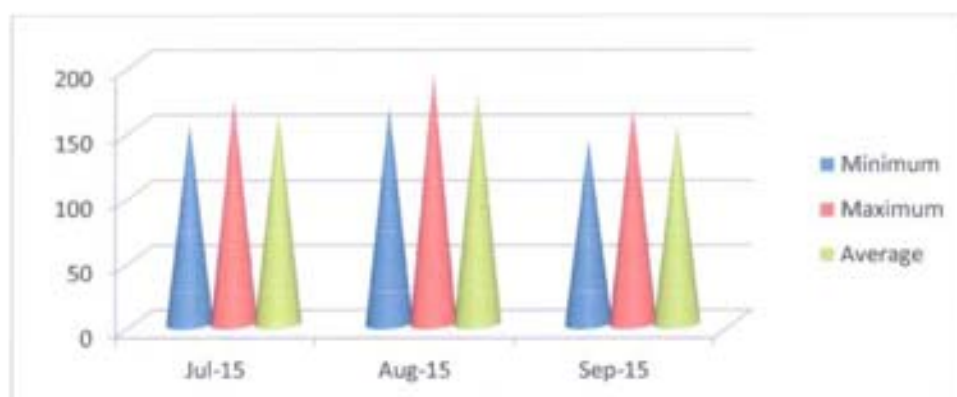
The summary of Statistical Analysis of SPM results for the month of July 2015 to September 2015 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as $154 \mu\text{g}/\text{m}^3$ and $173 \mu\text{g}/\text{m}^3$ respectively and average concentration of $164 \mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as $167 \mu\text{g}/\text{m}^3$ 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 $142 \mu\text{g}/\text{m}^3$ and $167 \mu\text{g}/\text{m}^3$ respectively and average concentration of $155 \mu\text{g}/\text{m}^3$.



Graph:- Sairaidh Campus

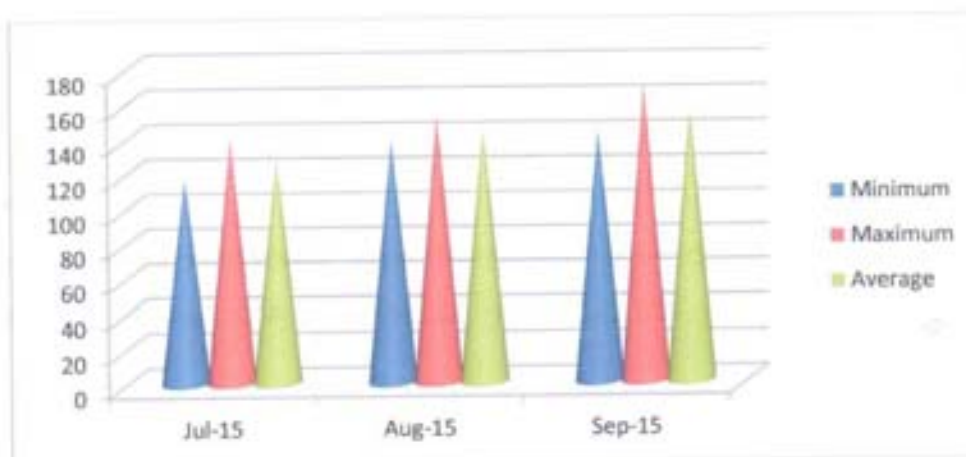


Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as 117 $\mu\text{g}/\text{m}^3$ and 139 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 128 $\mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as 138 $\mu\text{g}/\text{m}^3$ and 152 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 145 $\mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as 143 $\mu\text{g}/\text{m}^3$ and 169 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 156 $\mu\text{g}/\text{m}^3$.



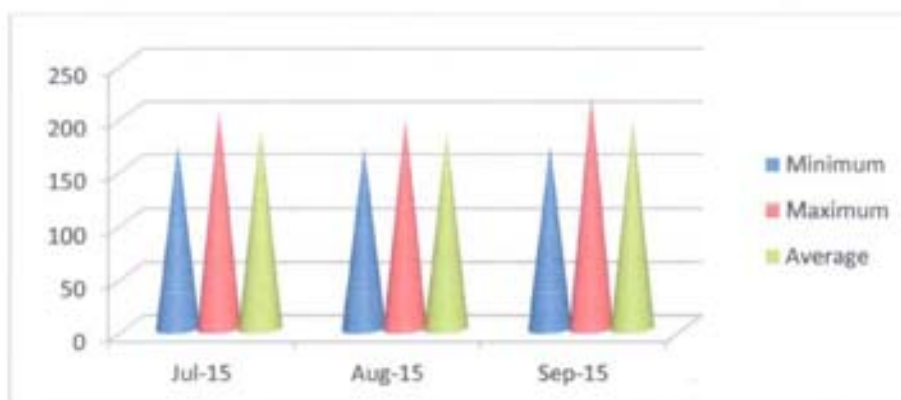
Graph:- Jaljali Village

Tatijharia Village/Nr.Weigh Bridge

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 $169 \mu\text{g}/\text{m}^3$ and $196 \mu\text{g}/\text{m}^3$ respectively and average concentration of $183 \mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as $171 \mu\text{g}/\text{m}^3$ and $218 \mu\text{g}/\text{m}^3$ respectively and average concentration of $195 \mu\text{g}/\text{m}^3$.



Graph:- Tatijharia Village/Nr.Weigh Bridge

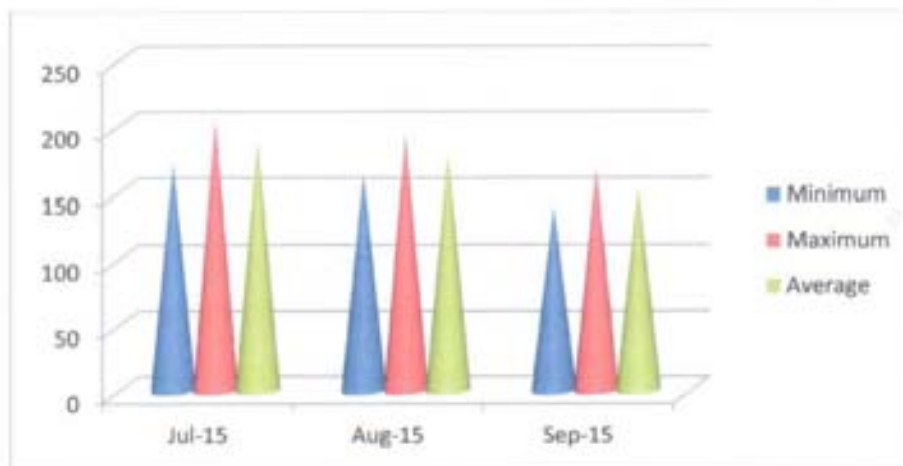


Piprapat/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for SPM were recorded as 173 $\mu\text{g}/\text{m}^3$ and 204 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 189 $\mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for SPM were recorded as 164 $\mu\text{g}/\text{m}^3$ and 193 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 179 $\mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for SPM were recorded as 139 $\mu\text{g}/\text{m}^3$ and 168 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 154 $\mu\text{g}/\text{m}^3$.



Graph:- Piprapat/Nr.Mining Area



Table 7

Statistical Analysis of RSPM

Location	Month & Year	Min.	Max.	A.M.	Unit : $\mu\text{g}/\text{m}^3$	
					G.M.	98%ile
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	July-2015	43	57	50	50	57
	August-2015	48	62	55	55	62
	September-2015	52	64	58	58	64
Rajendrapur/ Nr.Mining Area	July-2015	59	67	63	63	67
	August-2015	62	68	65	65	68
	September-2015	56	62	59	59	62
Kutku Village/ Nr.V.T. Center	July-2015	38	41	40	40	41
	August-2015	42	49	46	46	49
	September-2015	46	54	50	50	54
Dumerkholi/ Nr.Mining Area	July-2015	54	68	61	61	68
	August-2015	49	56	53	53	56
	September-2015	47	54	51	51	54
Buffer Zone :-						
Sairaidh Campus	July-2015	42	51	47	47	51
	August-2015	38	46	42	42	46
	September-2015	46	53	50	50	53
Jaljali Village	July-2015	47	56	52	52	56
	August-2015	42	48	45	45	48
	September-2015	37	41	39	39	41
Tatijharia Village/ Nr. Weigh bridge	July-2015	43	49	46	46	49
	August-2015	47	52	50	50	52
	September-2015	38	43	41	41	43
Piprapat/ Nr.Mining Area	July-2015	47	56	52	52	56
	August-2015	52	63	58	58	63
	September-2015	49	58	54	54	58
CPCB Standard		100 (24 hrs)				

Note :- All the Values are in CPCB Limit

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

Samri-Gopatu/ Nr.weigh bridge: For the Months of July-Aug-Sept-2015 Average of RSPM is $54 \mu\text{g}/\text{m}^3$.

Rajendrapur/Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of RSPM is $62 \mu\text{g}/\text{m}^3$.

Kutku Village / Nr.V.T. Center:- For the Months of July-Aug-Sept-2015 Average of RSPM is $45 \mu\text{g}/\text{m}^3$.

Dumerkholi/ Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of RSPM is $55 \mu\text{g}/\text{m}^3$.

Buffer Zone :-

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

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

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

Piprapat/ Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of RSPM is $55 \mu\text{g}/\text{m}^3$.

Monthwise Summary of Statistical Analysis of RSPM

3.2 Fugitive Emission (Core Zone):-

3.2.1 Presentation of Results.

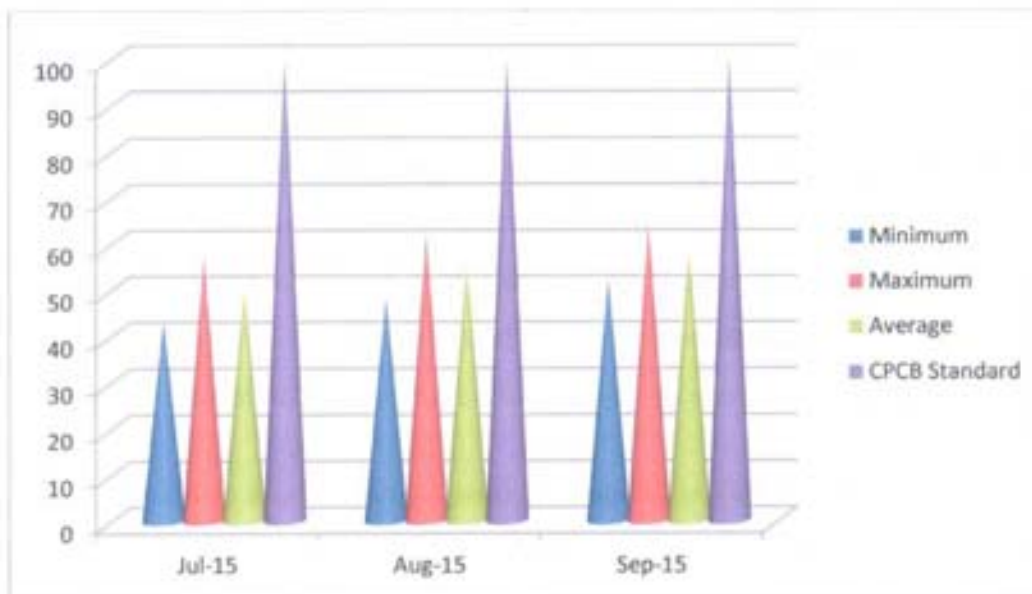
The summary of Statistical Analysis of RSPM results for the month of July 2015 to September 2015 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as 43 $\mu\text{g}/\text{m}^3$ and 57 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 50 $\mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as 48 $\mu\text{g}/\text{m}^3$ and 62 $\mu\text{g}/\text{m}^3$ 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 52 $\mu\text{g}/\text{m}^3$ and 64 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 58 $\mu\text{g}/\text{m}^3$.



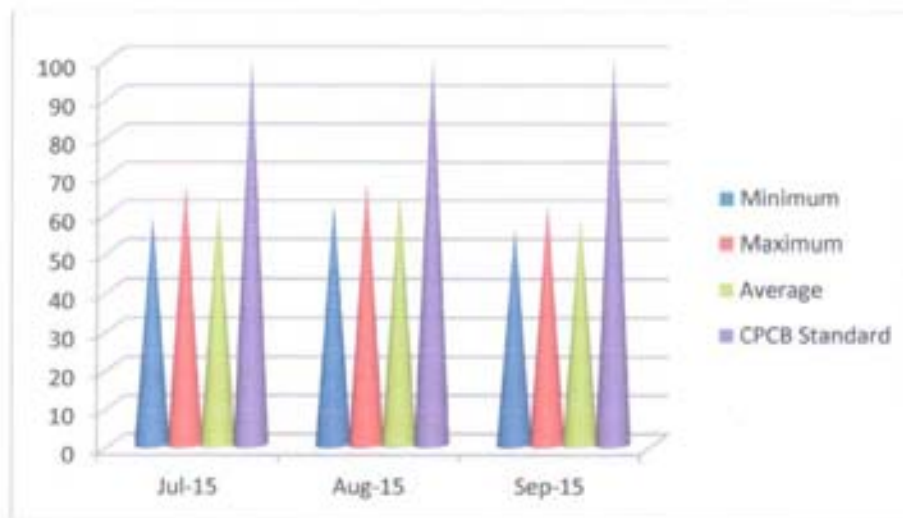


Rajendrapur/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as $59 \mu\text{g}/\text{m}^3$ and $67 \mu\text{g}/\text{m}^3$ respectively and average concentration of $63 \mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as $62 \mu\text{g}/\text{m}^3$ and $68 \mu\text{g}/\text{m}^3$ respectively and average concentration of $65 \mu\text{g}/\text{m}^3$.

For the month of September-2015 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 $59 \mu\text{g}/\text{m}^3$.



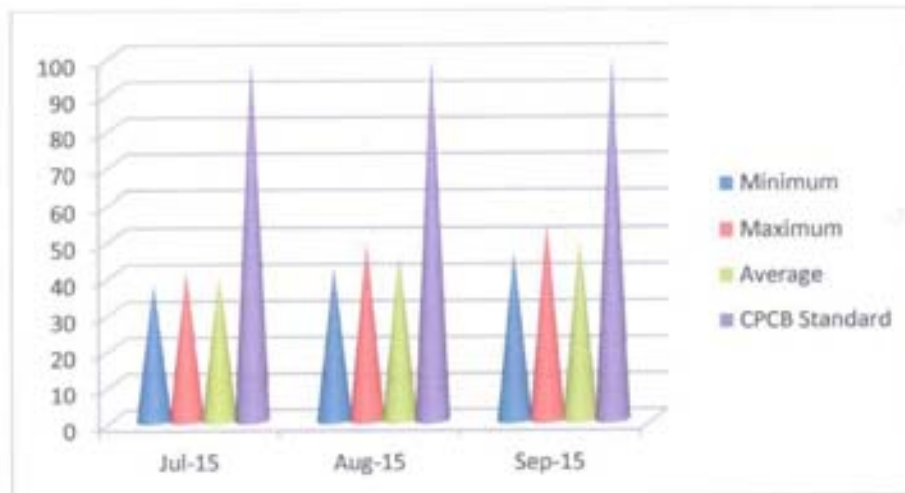


Kutku Village/Nr.V.T. Center

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as $38 \mu\text{g}/\text{m}^3$ and $41 \mu\text{g}/\text{m}^3$ respectively and average concentration of $40 \mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as $42 \mu\text{g}/\text{m}^3$ and $49 \mu\text{g}/\text{m}^3$ respectively and average concentration of $46 \mu\text{g}/\text{m}^3$.

For the month of September-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 $50 \mu\text{g}/\text{m}^3$.



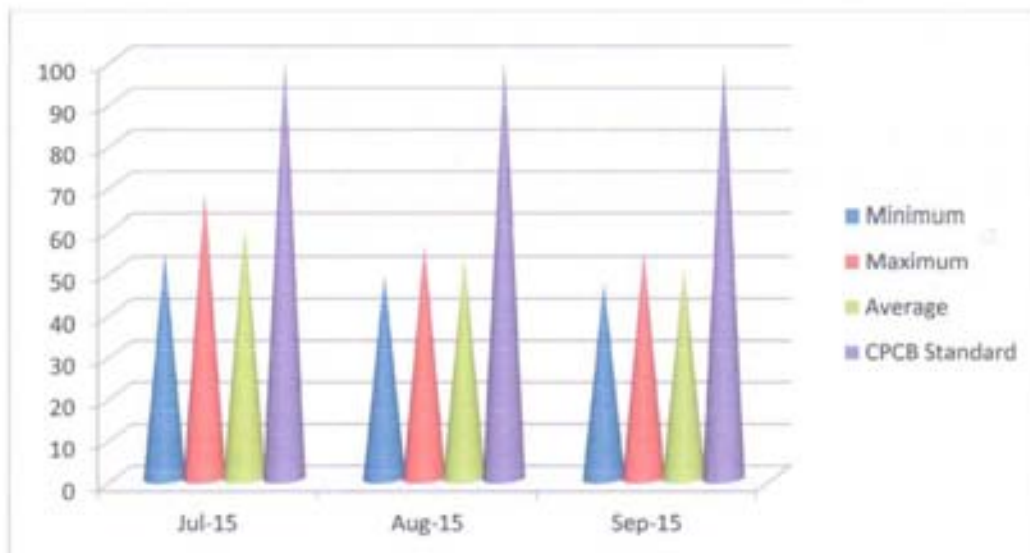


Dumerkholi/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as 54 $\mu\text{g}/\text{m}^3$ and 68 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 61 $\mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as 49 $\mu\text{g}/\text{m}^3$ and 56 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 53 $\mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as 47 $\mu\text{g}/\text{m}^3$ and 54 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 51 $\mu\text{g}/\text{m}^3$.





3.3 Fugitive Emission (Buffer Zone):-

3.3.1 Presentation of Results.

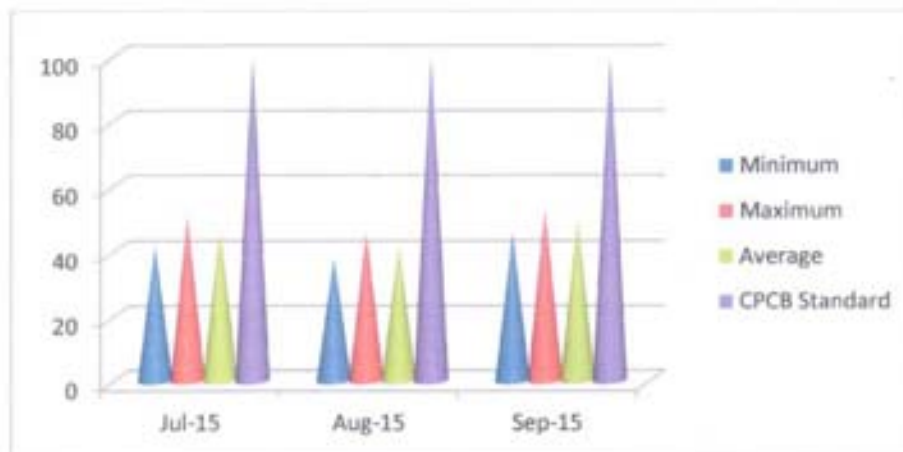
The summary of Statistical Analysis of RSPM results for the month of July 2015 to September 2015 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as 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 38 $\mu\text{g}/\text{m}^3$ 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 46 $\mu\text{g}/\text{m}^3$ and 53 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 50 $\mu\text{g}/\text{m}^3$.



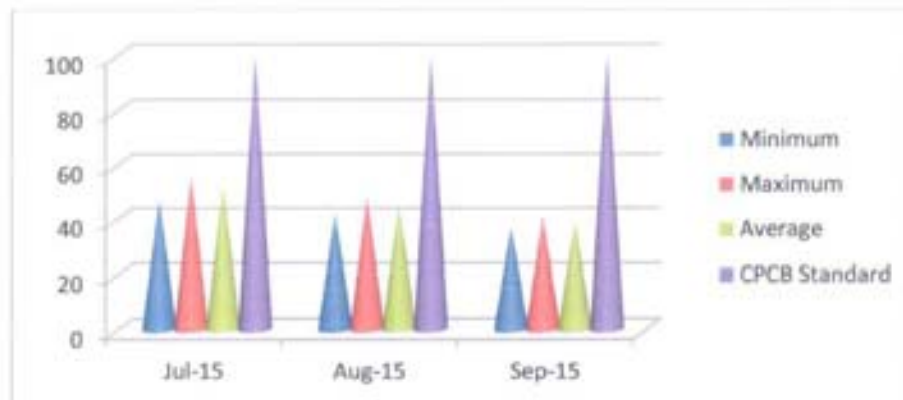


Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as $47 \mu\text{g}/\text{m}^3$ and $56 \mu\text{g}/\text{m}^3$ respectively and average concentration of $52 \mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as $42 \mu\text{g}/\text{m}^3$ and $48 \mu\text{g}/\text{m}^3$ respectively and average concentration of $45 \mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as $37 \mu\text{g}/\text{m}^3$ and $41 \mu\text{g}/\text{m}^3$ respectively and average concentration of $39 \mu\text{g}/\text{m}^3$.

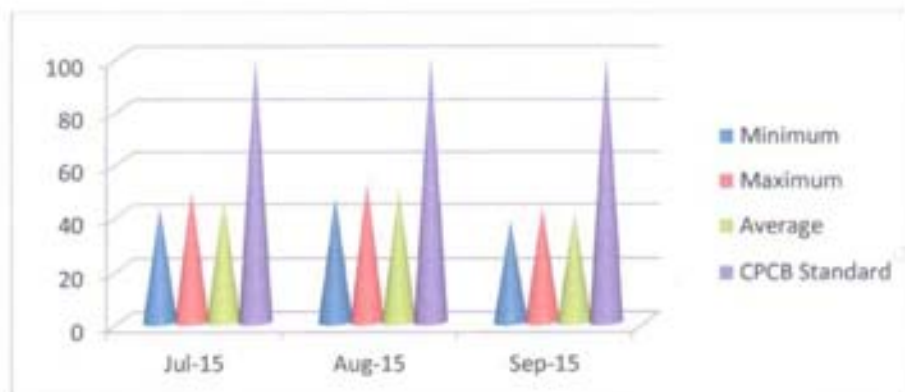


Tatijharia Village

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as $43 \mu\text{g}/\text{m}^3$ and $49 \mu\text{g}/\text{m}^3$ 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 $47 \mu\text{g}/\text{m}^3$ and $52 \mu\text{g}/\text{m}^3$ respectively and average concentration of $50 \mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as $38 \mu\text{g}/\text{m}^3$ and $43 \mu\text{g}/\text{m}^3$ respectively and average concentration of $41 \mu\text{g}/\text{m}^3$.





Piprapat/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for RSPM were recorded as $47 \mu\text{g}/\text{m}^3$ and $56 \mu\text{g}/\text{m}^3$ respectively and average concentration of $52 \mu\text{g}/\text{m}^3$.

For the month of August-2015 the minimum and maximum concentrations for RSPM were recorded as $52 \mu\text{g}/\text{m}^3$ and $63 \mu\text{g}/\text{m}^3$ respectively and average concentration of $58 \mu\text{g}/\text{m}^3$.

For the month of September-2015 the minimum and maximum concentrations for RSPM were recorded as $49 \mu\text{g}/\text{m}^3$ and $58 \mu\text{g}/\text{m}^3$ respectively and average concentration of $54 \mu\text{g}/\text{m}^3$.

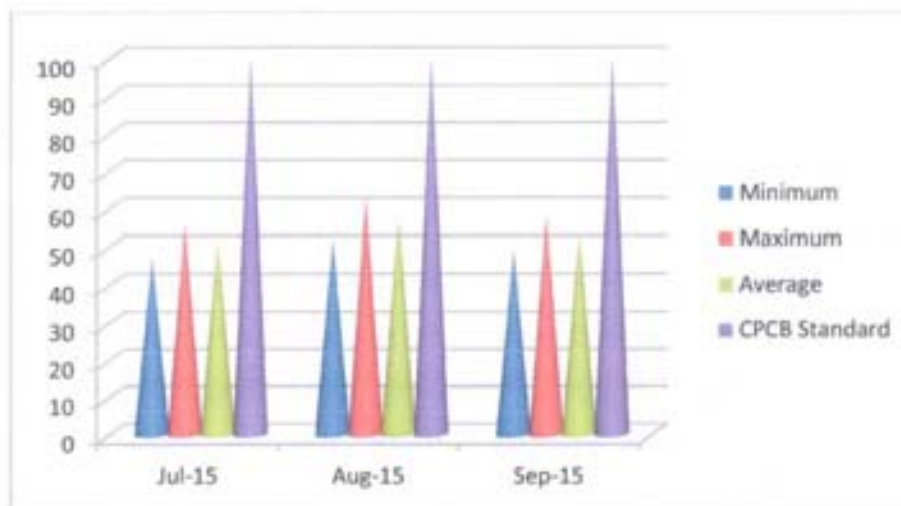




Table 8
Statistical Analysis of PM 2.5

Location	Month & Year	Min.	Max.	Unit : $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%
Samri-Gopatu/ Near Weigh bridge	July-2015	16	21	19	19	21
	August-2015	18	26	22	22	26
	September-2015	21	32	27	27	32
CPCB Standard		60 (24 hrs)				

Note :- All the Values are in CPCB Limit

Samri-Gopatu/ Nr.weigh bridge: For the months of July-Aug-Sept-2015 Average of $\text{PM}_{2.5}$ is $23 \mu\text{g}/\text{m}^3$.

3.4 Statistical Analysis of PM 2.5:-

3.4.1 Presentation of Results.

The summary of Statistical Analysis of $\text{PM}_{2.5}$ results for the month of July 2015 to September 2015 are presented in detail in **Table 8**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/Near Weigh Bridge

For the month of July-2015 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $16 \mu\text{g}/\text{m}^3$ and $21 \mu\text{g}/\text{m}^3$ respectively and average concentration of $19 \mu\text{g}/\text{m}^3$. For the month of August-2015 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $18 \mu\text{g}/\text{m}^3$ and $26 \mu\text{g}/\text{m}^3$ respectively and average concentration of $22 \mu\text{g}/\text{m}^3$. For the month of Sept-2015 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $21 \mu\text{g}/\text{m}^3$ and $32 \mu\text{g}/\text{m}^3$ respectively and average concentration of $27 \mu\text{g}/\text{m}^3$.

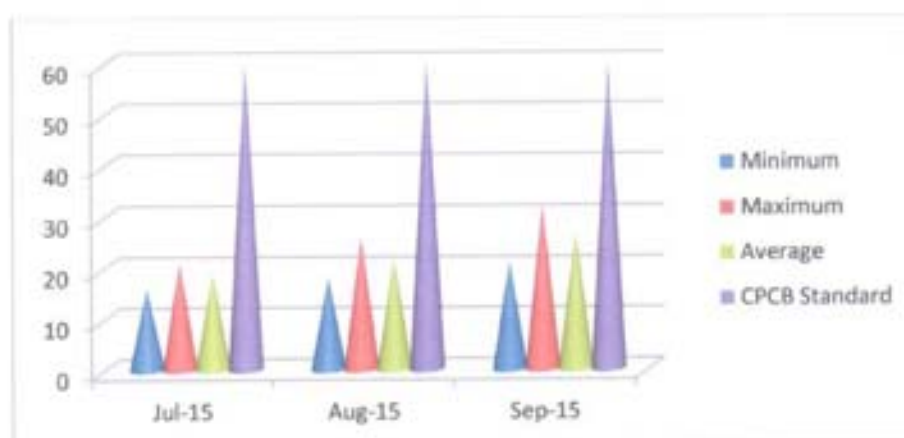




Table 9
Statistical Analysis of SO₂

Unit : µg/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	July-2015	6	9	8	8	9
	August-2015	6	11	9	9	11
	September-2015	7	13	10	10	13
Rajendrapur/ Nr.Mining Area	July-2015	7	12	10	10	12
	August-2015	6	9	8	8	9
	September-2015	8	14	11	11	14
Kutku Village/ Nr.V.T. Center	July-2015	6	9	8	8	9
	August-2015	7	11	9	9	11
	September-2015	6	8	7	7	8
Dumerkholi/ Nr.Mining Area	July-2015	7	13	10	10	13
	August-2015	6	12	9	9	12
	September-2015	9	16	13	13	16
Buffer Zone :-						
Sairaidh Campus	July-2015	6	9	8	8	9
	August-2015	6	8	7	7	8
	September-2015	7	9	8	8	9
Jaljali Village	July-2015	7	11	9	9	11
	August-2015	6	9	8	8	9
	September-2015	7	9	8	8	9
Tatijharia Village/ Nr. Weigh bridge	July-2015	9	12	11	11	12
	August-2015	8	11	10	10	11
	September-2015	6	9	8	8	9
Piprapat/ Nr.Mining Area	July-2015	7	11	9	9	11
	August-2015	6	9	8	8	9
	September-2015	7	13	10	10	13
CPCB Standard		80 (24 hrs)				

Note :- All the Values are in CPCB Limit

Fugitive Emission (Core Zone):- (Average of SO₂ July-August-September-2015)

Samri-Gopatu/ Nr.weigh bridge: For the Months of July-Aug-Sept-2015 Average of SO₂ is 9 µg/m³.

Rajendrapur/Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of SO₂ is 10 µg/m³.

Kutku Village / Nr.V.T. Center:- For the Months of July-Aug-Sept-2015 Average of SO₂ is 8 µg/m³.

Dumerkholi/ Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of SO₂ is 11 µg/m³.

Buffer Zone :-

Sairaidh Campus:- For the Months of July-Aug-Sept-2015 Average of SO₂ is 8 µg/m³.

Jaljali Village:- For the Months of July-Aug-Sept-2015 Average of SO₂ is 8 µg/m³.

Tatijharia Village/ Nr. Weigh bridge:- For the Months of July-Aug-Sept-2015 Average of SO₂ is 10 µg/m³.

Piprapat/ Nr.Mining Area:- For the Months of July-Aug-Sept-2015 Average of SO₂ is 9 µg/m³.

Monthwise Summary of Statistical Analysis of SO₂

3.5 Fugitive Emission (Core Zone):-

3.5.1 Presentation of Results.

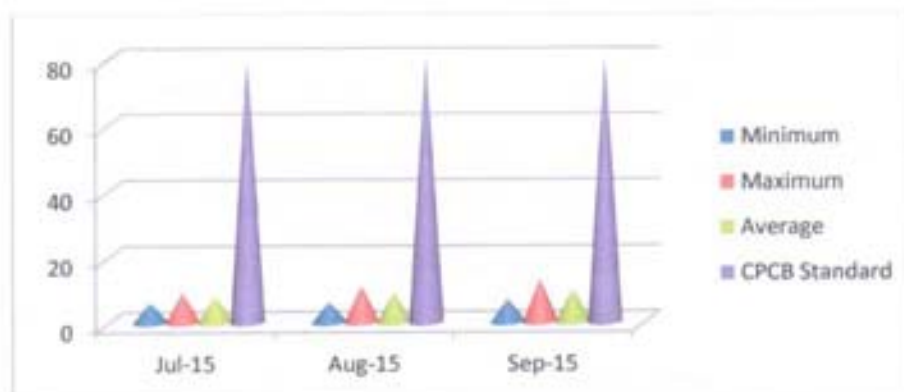
The summary of Statistical Analysis of SO₂ results for the month of July 2015 to September 2015 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 13 µg/m³ respectively and average concentration of 10 µg/m³.



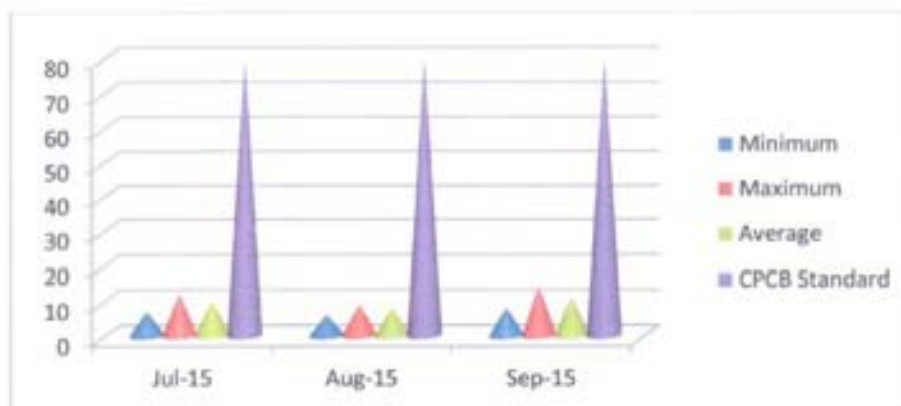


Rajendrapur/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 12 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 14 µg/m³ respectively and average concentration of 11 µg/m³.



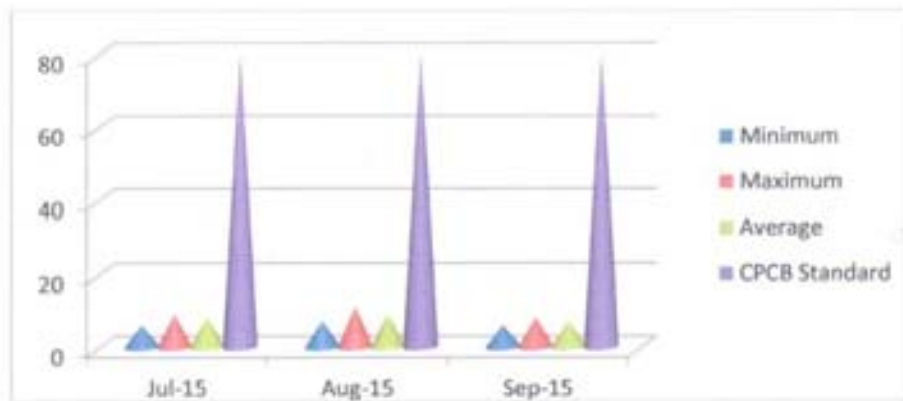


Kutku Village/Nr.V.T. Center

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 8 µg/m³ respectively and average concentration of 7 µg/m³.



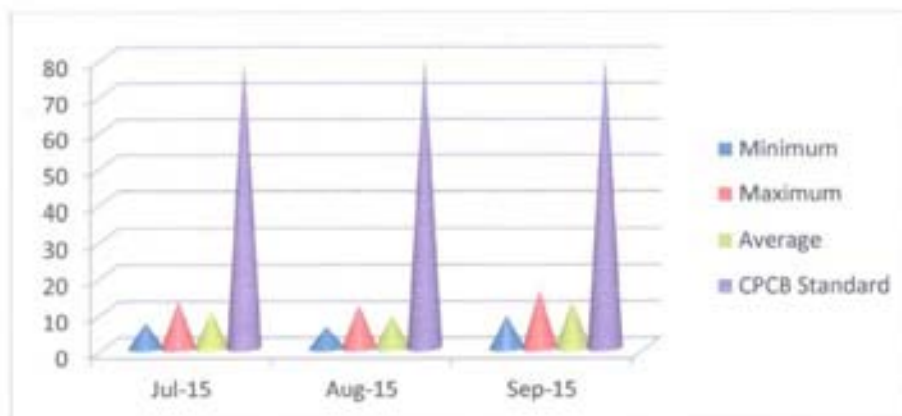


Dumerkholi/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 13 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 12 µg/m³ respectively and average concentration of 9 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 16 µg/m³ respectively and average concentration of 13 µg/m³.





3.6 Fugitive Emission (Buffer Zone):-

3.6.1 Presentation of Results.

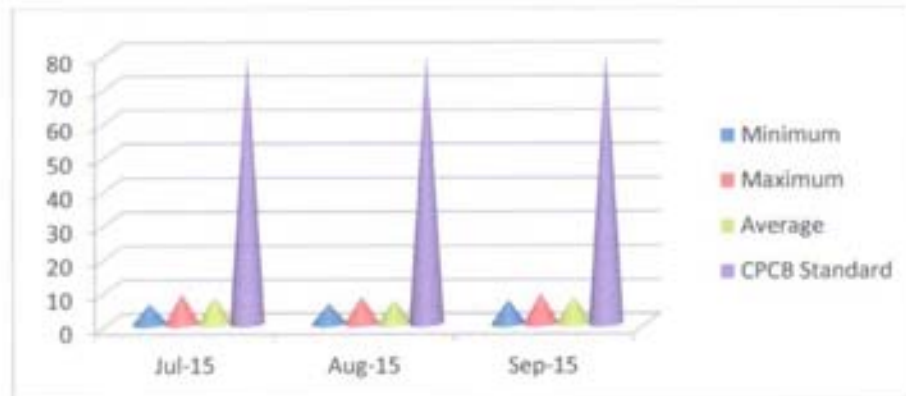
The summary of Statistical Analysis of SO_x results for the month of July 2015 to September 2015 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 8 µg/m³ respectively and average concentration of 7 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.



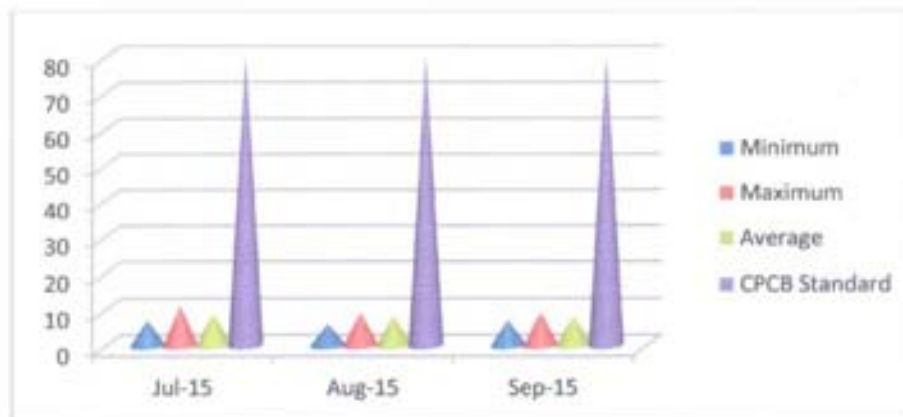


Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.



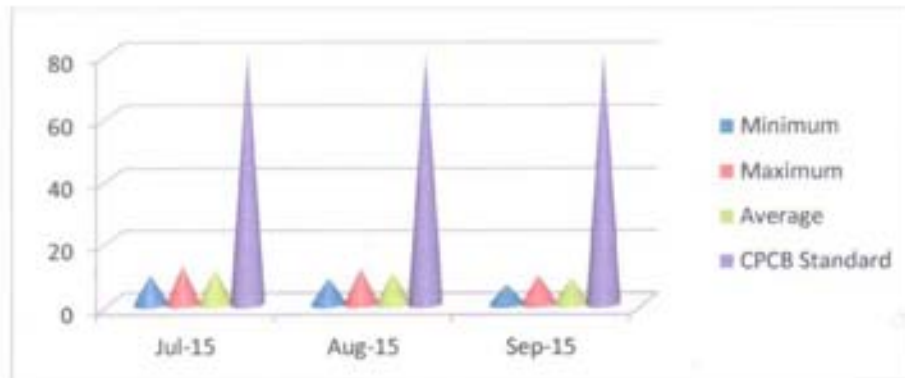


Tatijharia Village/Nr.Weigh Bridge

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 12 µg/m³ respectively and average concentration of 11 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.





Piprapat/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 13 µg/m³ respectively and average concentration of 10 µg/m³.

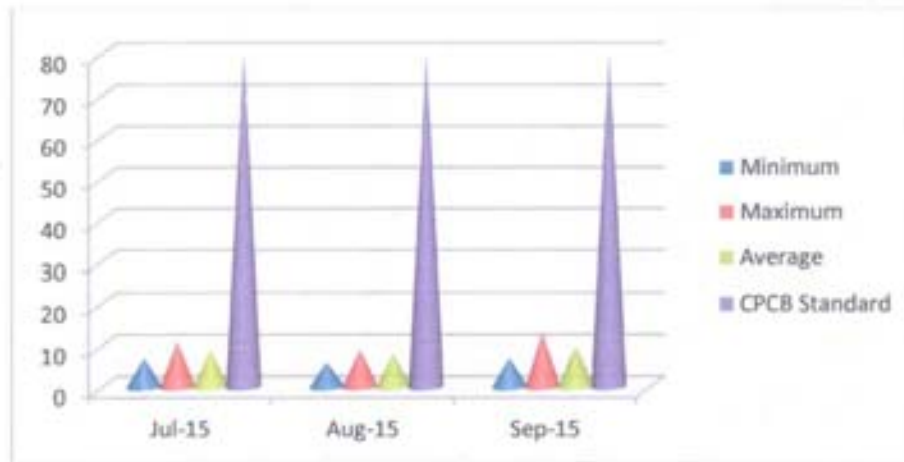




Table-10
Statistical Analysis of NO_x

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	July-2015	16	24	20	20	24
	August-2015	18	27	23	23	27
	September-2015	21	31	26	26	31
Rajendrapur/ Nr.Mining Area	July-2015	14	19	17	17	19
	August-2015	19	24	22	22	24
	September-2015	16	21	19	19	21
Kutku Village/ Nr.V.T. Center	July-2015	13	17	15	15	17
	August-2015	16	23	20	20	23
	September-2015	17	24	21	21	24
Dumerkholi/ Nr.Mining Area	July-2015	18	21	20	20	21
	August-2015	16	23	20	20	23
	September-2015	21	28	25	25	28
Buffer Zone :-						
Sairaidh Campus	July-2015	12	18	15	15	18
	August-2015	13	19	16	16	19
	September-2015	16	24	20	20	24
Jaljali Village	July-2015	13	18	16	16	18
	August-2015	16	23	20	20	23
	September-2015	17	26	22	22	26
Tatijharia Village/ Nr. Weigh bridge	July-2015	14	21	18	18	21
	August-2015	16	28	22	22	28
	September-2015	14	23	19	19	23
Piprapat/ Nr.Mining Area	July-2015	14	21	18	18	21
	August-2015	16	24	20	20	24
	September-2015	18	26	22	22	26
CPCB Standard		80 (24 hrs)				

Note :- All the Values are in CPCB Limit

Fugitive Emission (Core Zone):- (Average of NO_x July-August-Septemr-2015)

Samri-Gopatu/ Nr.weigh bridge: For the Months of July-August-Sept-2015 Average of NO_x is 23 $\mu\text{g}/\text{m}^3$.

Rajendrapur/Nr.Mining Area:- For the Months of July-August-Sept-2015Average of NO_x is 19 $\mu\text{g}/\text{m}^3$.

Kutku Village / Nr.V.T. Center:- For the Months of July-August-Sept-2015 Average of NO_x is 19 $\mu\text{g}/\text{m}^3$.

Dumerkholi/ Nr.Mining Area:- For the Months of July-August-Sept-2015 Average of NO_x is 22 $\mu\text{g}/\text{m}^3$.

Buffer Zone :-

Sairaidh Campus:- For the Months of July-August-Sept-2015 Average of NO_x is 17 $\mu\text{g}/\text{m}^3$.

Jaljali Village:- For the Months of July-August-Sept-2015 Average of NO_x is 19 $\mu\text{g}/\text{m}^3$.

Tatijharia Village/ Nr. Weigh bridge:- For the Months of July-August-Sept-2015Average of NO_x is 20 $\mu\text{g}/\text{m}^3$.

Piprapat/ Nr.Mining Area:- For the Months of July-August-Sept-2015 Average of NO_x is 20 $\mu\text{g}/\text{m}^3$.

Monthwise Summary of Statistical Analysis of NO_x

3.7 Fugitive Emission (Core Zone):-

3.7.1 Presentation of Results.

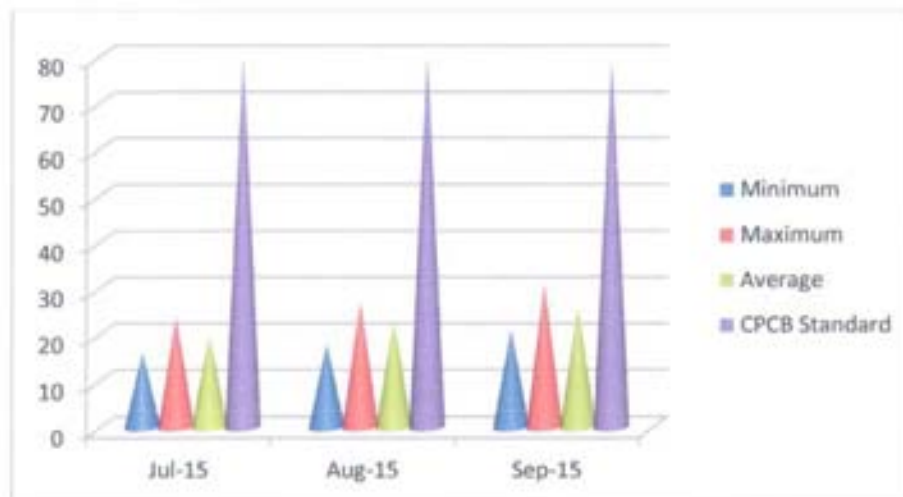
The summary of Statistical Analysis of NO_x results for the month of July 2015 to September 2015 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 24 µg/m³ respectively and average concentration of 20 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 27 µg/m³ respectively and average concentration of 23 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 31 µg/m³ respectively and average concentration of 26 µg/m³.



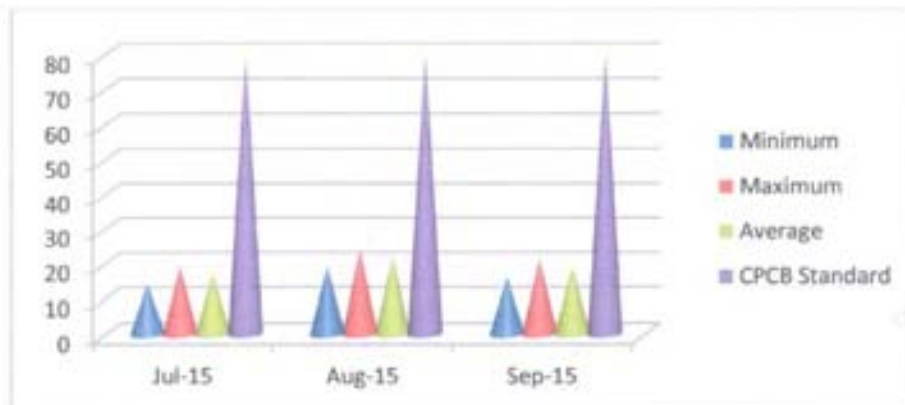


Rajendrapur/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 14 µg/m³ and 19 µg/m³ respectively and average concentration of 17 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 24 µg/m³ respectively and average concentration of 22 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 21 µg/m³ respectively and average concentration of 19 µg/m³.



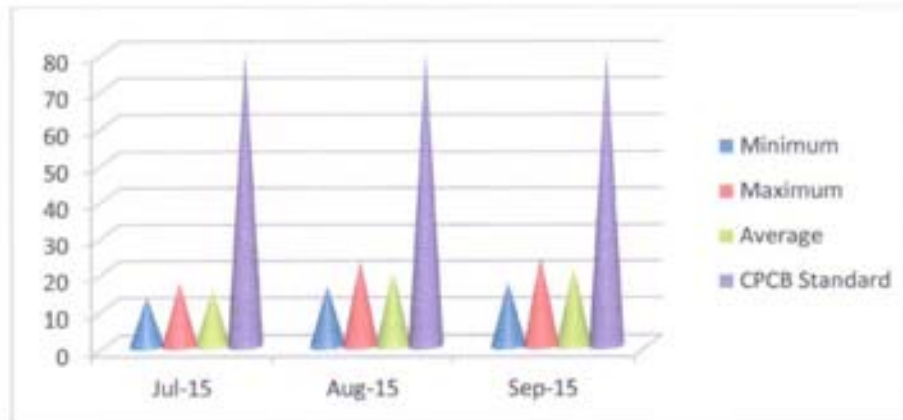


Kutku Village/Nr.V.T. Center

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 13 µg/m³ and 17 µg/m³ respectively and average concentration of 15 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 23 µg/m³ respectively and average concentration of 20 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 17 µg/m³ and 24 µg/m³ respectively and average concentration of 21 µg/m³.

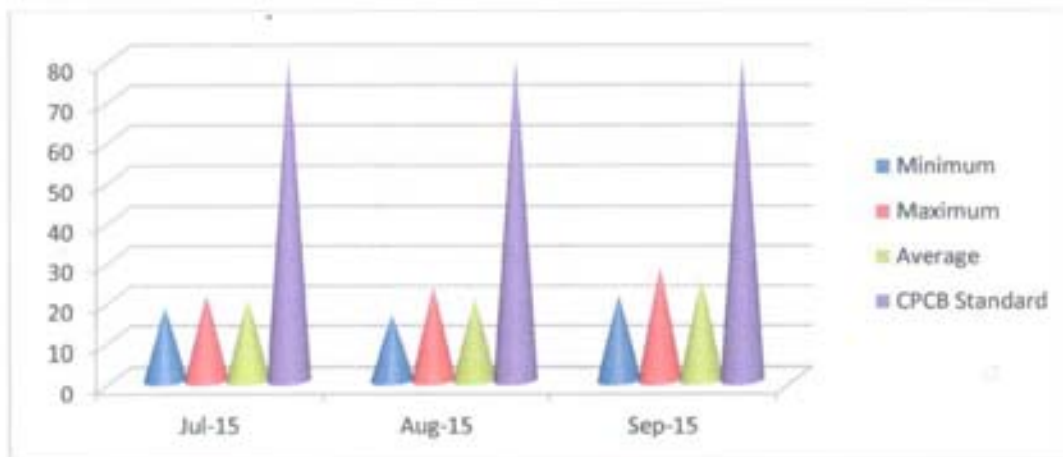


Dumerkholi/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 21 µg/m³ respectively and average concentration of 20 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 23 µg/m³ respectively and average concentration of 20 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 28 µg/m³ respectively and average concentration of 25 µg/m³.





3.8 Fugitive Emission (Buffer Zone):-

3.8.1 Presentation of Results.

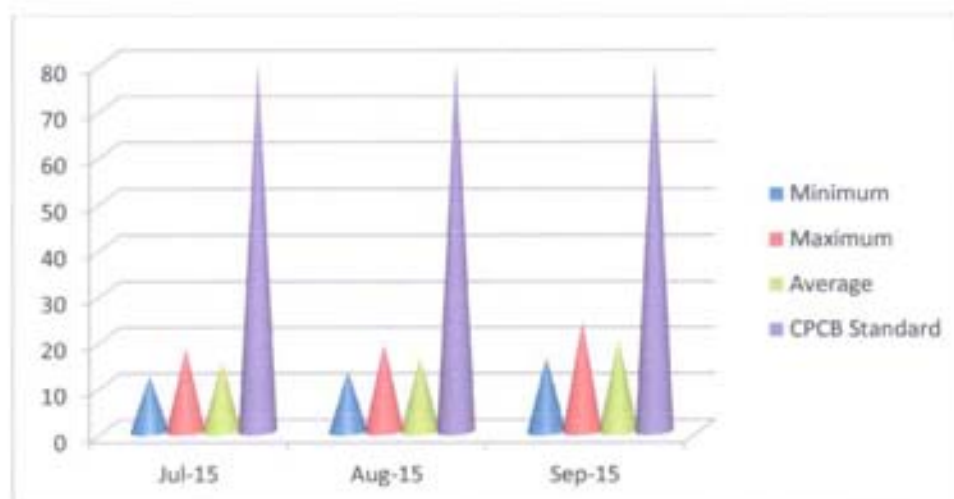
The summary of Statistical Analysis of NO_x results for the month of July 2015 to September 2015 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 12 µg/m³ and 18 µg/m³ respectively and average concentration of 15 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 13 µg/m³ and 19 µg/m³ respectively and average concentration of 16 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 24 µg/m³ respectively and average concentration of 20 µg/m³.

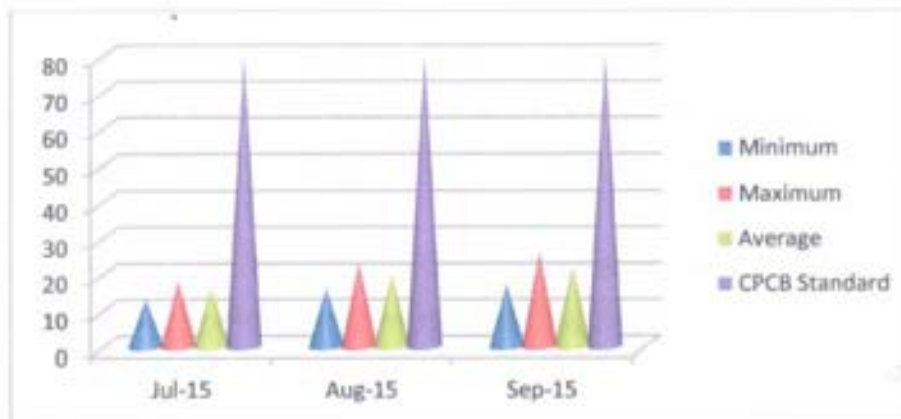


Jaljali Village

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 13 µg/m³ and 18 µg/m³ respectively and average concentration of 16 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 23 µg/m³ respectively and average concentration of 20 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 17 µg/m³ and 26 µg/m³ respectively and average concentration of 22 µg/m³.



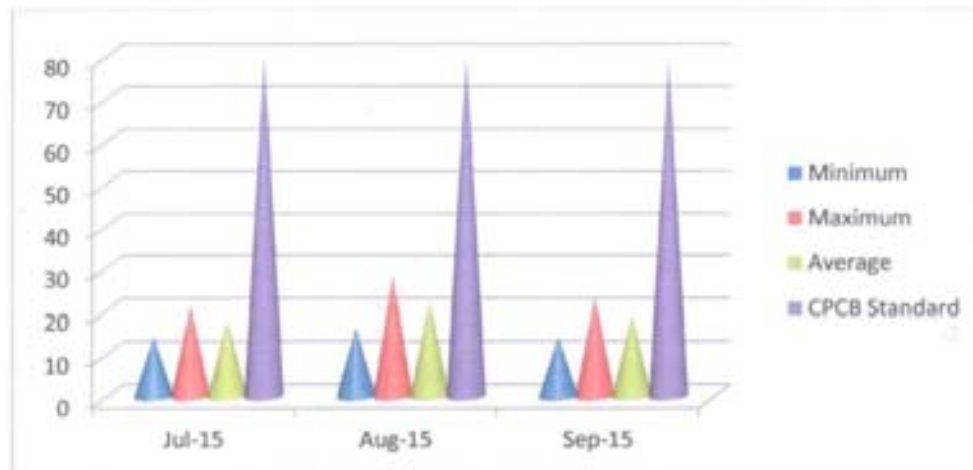


Tatijharia Village/Nr.Weigh Bridge

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 14 µg/m³ and 21 µg/m³ respectively and average concentration of 18 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 28 µg/m³ respectively and average concentration of 22 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 14 µg/m³ and 23 µg/m³ respectively and average concentration of 19 µg/m³.



Piprapat/Nr.Mining Area

For the month of July-2015 the minimum and maximum concentrations for NO_x were recorded as 14 µg/m³ and 21 µg/m³ respectively and average concentration of 18 µg/m³.

For the month of August-2015 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 24 µg/m³ respectively and average concentration of 20 µg/m³.

For the month of September-2015 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 26 µg/m³ respectively and average concentration of 22 µg/m³.

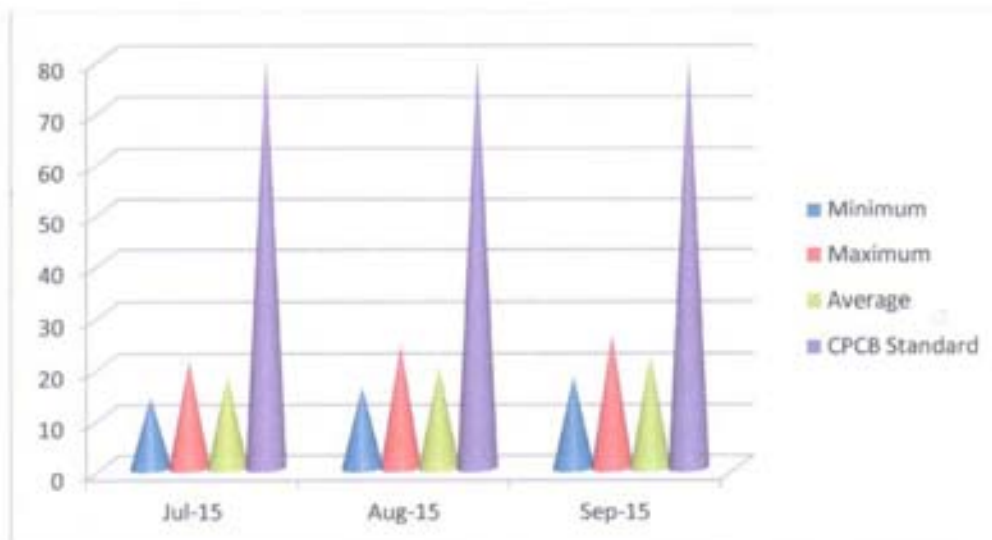




Table 11
Statistical Analysis of Pb

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	July-2015	0.016	0.028	0.022	0.022	0.028
	August-2015	0.019	0.037	0.028	0.028	0.037
	September-2015	0.017	0.023	0.020	0.020	0.023
Rajendrapur/ Nr.Mining Area	July-2015	0.028	0.041	0.035	0.035	0.041
	August-2015	0.026	0.039	0.033	0.033	0.039
	September-2015	0.018	0.026	0.022	0.022	0.026
Kutku Village/ Nr.V.T. Center	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
Dumerkholi/ Nr.Mining Area	July-2015	0.018	0.029	0.024	0.024	0.029
	August-2015	0.016	0.024	0.020	0.020	0.024
	September-2015	0.023	0.031	0.027	0.027	0.031
Buffer Zone :-						
Sairaidh Campus	July-2015	0.016	0.021	0.019	0.019	0.021
	August-2015	0.019	0.024	0.022	0.022	0.024
	September-2015	0.014	0.018	0.016	0.016	0.018
Jaljali Village	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
Tatijharia Village/ Nr. Weigh bridge	July-2015	0.021	0.027	0.024	0.024	0.027
	August-2015	0.024	0.038	0.031	0.031	0.038
	September-2015	0.019	0.026	0.023	0.023	0.026
Piprapat/ Nr.Mining Area	July-2015	0.021	0.037	0.029	0.029	0.037
	August-2015	0.017	0.026	0.022	0.022	0.026
	September-2015	0.024	0.038	0.031	0.031	0.038
CPCB Standard		1.0 (24 hrs)				

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%ile
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	July-2015	0.014	0.019	0.017	0.017	0.019
	August-2015	0.018	0.024	0.021	0.021	0.024
	September-2015	0.016	0.021	0.019	0.019	0.021
Rajendrapur/ Nr.Mining Area	July-2015	0.018	0.026	0.022	0.022	0.026
	August-2015	0.021	0.037	0.029	0.029	0.037
	September-2015	0.019	0.032	0.026	0.026	0.032
Kutku Village/ Nr.V.T. Center	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
Dumerkholi/ Nr.Mining Area	July-2015	0.017	0.024	0.021	0.021	0.024
	August-2015	0.016	0.021	0.019	0.019	0.021
	September-2015	0.017	0.026	0.022	0.022	0.026
Buffer Zone :-						
Sairaidh Campus	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
Jaljali Village	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
Tatijharia Village/ Nr. Weigh bridge	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
Piprapat/ Nr.Mining Area	July-2015	0.014	0.019	0.017	0.017	0.019
	August-2015	0.018	0.024	0.021	0.021	0.024
	September-2015	0.017	0.021	0.019	0.019	0.021
CPCB Standard		----				



Table 13
Statistical Analysis of As

Unit: ng/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	July-2015	0.11	0.18	0.15	0.15	0.18
	August-2015	0.14	0.21	0.18	0.18	0.21
	September-2015	0.13	0.19	0.16	0.16	0.19
Rajendrapur/ Nr.Mining Area	July-2015	0.18	0.24	0.21	0.21	0.24
	August-2015	0.21	0.32	0.27	0.27	0.32
	September-2015	0.19	0.21	0.20	0.20	0.21
Kutku Village/ Nr.V.T. Center	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
Dumerkholi/ Nr.Mining Area	July-2015	0.18	0.26	0.22	0.22	0.26
	August-2015	0.21	0.38	0.30	0.30	0.38
	September-2015	0.24	0.43	0.34	0.34	0.43
Buffer Zone :-						
Sairaidh Campus	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
Jaljali Village	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
Tatijharia Village/ Nr. Weigh bridge	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
Piprapat/ Nr.Mining Area	July-2015	0.16	0.21	0.19	0.19	0.21
	August-2015	0.14	0.19	0.17	0.17	0.19
	September-2015	0.16	0.23	0.20	0.20	0.23
CPCB Standard		06 (Annual)				

Note :- All the Values are in CPCB Limit

	<p align="center">Hindalco Industries Limited Samri Mining Environmental Status Report for July-2015 To September-2015</p>	<p align="center">Introduction</p>
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Free Silica :-

Sr. No.	Location	Measurement Unit	July-2015		August-2015		September-2015	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Rajendrapur/ Near Mining Area	g/100gm	0.37	0.08	0.43	0.11	0.41	0.09

Table 14

Dust fall Rate

Sr. No.	Location	July-2015	August-2015	September-2015	Average
		Rate (MT/km ² /Month)			
1.	Rajendrapur/Nr.Mining Area	21.57	28.16	31.52	27.08
2.	Samri-Gopatu/Nr.Weigh Bridge	16.64	23.92	26.47	22.34



Table-15

Noise Level Monitoring

Unit: dB(A)

Sl. No.	Location	July-2015		August-2015		September-2015	
		Day	Night	Day	Night	Day	Night
Core Zone							
1.	Samri-Gopatu/Nr.Weigh Bridge	54	43	58	51	47	42
2.	Rajendrapur/Nr.Mining Area	62	56	56	49	62	53
3.	Kutku Village/Nr.V.T.Center	47	38	51	42	49	41
4.	Dumerkholi/Nr.Mining Area	56	43	63	52	61	49
Buffer Zone							
1.	Sairaidh Campus	47	38	49	41	52	43
2.	Jaljali Village	51	39	47	38	52	41
3.	Tatijharia Village/Nr.Weigh Bridge	53	41	48	42	51	42
4.	Piprapat/Near Mining Area	47	37	51	43	48	39

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

Table 15-(A)

HEMM Spot Noise Level Monitoring

Sl. No.	Location	July-2015			August-2015			September-2015		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1.	Rajendrapur/Nr .Mining Area	68.2	76.9	72.6	73.8	87.2	80.5	74.9	83.7	79.3

Note:- All the Values are in CPCB Limit.



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

Table 16

Report on Chemical Examination of Ground Water
(Average of Three Months July-August-September-2015)

Location:	GW1) Rajendrapur / Near Mining Area
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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	7.37 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.8
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	3
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	0.16
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	317
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.24
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 ₃)	mg/l	IS 3025 (Part 23)	200	600	103.91
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	170.80
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	58.19
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	6.17
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	52.83
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	4.1
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	< 0.005
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	0.21

< indicates detection limit of the laboratory.

Contd.....



(Contd.....)

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

< indicates detection limit of the laboratory.

Contd.....



(Contd.....)

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)	Test Result
44.	Pesticides residues				
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

(Nallahs Near by Rajendrapur/Near Mining Area)

(Average of Three Months July-August-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	6.81 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	4.2
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	9
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	0.3	No relaxation	0.24
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	451
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.19
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	137.82
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	141.67
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	251.65
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	82.73
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	10.92
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	68.49
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	7.6
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	0.27

< indicates detection limit of the laboratory.

Contd.....



(Contd.....)

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	0.18
31.	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03
32.	Chloramines (as Cl ₂)	mg/l	APHA 4500-Cl ₂ G	4.0	No relaxation	< 0.01
33.	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
34.	Silver (as Ag)	mg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
35.	Polychlorinated Biphenyls (PCB)	µg/l	USEPA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	0.14
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 ₆ H ₅ 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.	Escherichia coli	Per100 ml	IS 1622	Absent	Absent	Present

< indicates detection limit of the laboratory.

Contd.....



(Contd.....)

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)	Test Result
44.	Pesticides residues				
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

Soil Analysis Report

Date of collection: September-2015

Sr. No	Test Parameters	Measurement Unit	Results
			Rajendrapur/Nr.Mining Area
1	pH	-	7.03 at 25 ^o C
2	Electrical Conductivity at 25 ^o C	μS/cm	258
3	Texture	-	Silty clay
4	Sand	%	31.6
5	Silt	%	27.8
6	Clay	%	40.6
7	Bulk Density	g/cc	1.21
8	Porosity	%	27
9	Water Holding Capacity	%	52
10	Exchangeable Calcium as Ca	mg/kg	24.9
11	Exchangeable Magnesium as Mg	mg/kg	8.1
12	Exchangeable Sodium as Na	mg/kg	42.8
13	Available Potassium as K	kg/ha.	54.9
14	Available Phosphorous as P	kg/ha.	71.3
15	Available Nitrogen as N	kg/ha.	239.1
16	Organic Matter	%	0.17
17	Organic Carbon	%	0.11
18	Water Soluble Chloride as Cl ⁺	mg/kg	23.8
19	Water Soluble Sulphate as SO ₄	mg/kg	6.1
20	Sodium Absorption Ratio	-	7.02
21	CEC	meq/100 gm	16.8
22	Total Iron	%	5.7
23	Available Manganese	mg/kg	0.03
24	Available Zinc	mg/kg	0.021
25	Available Boron	mg/kg	0.004

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

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

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

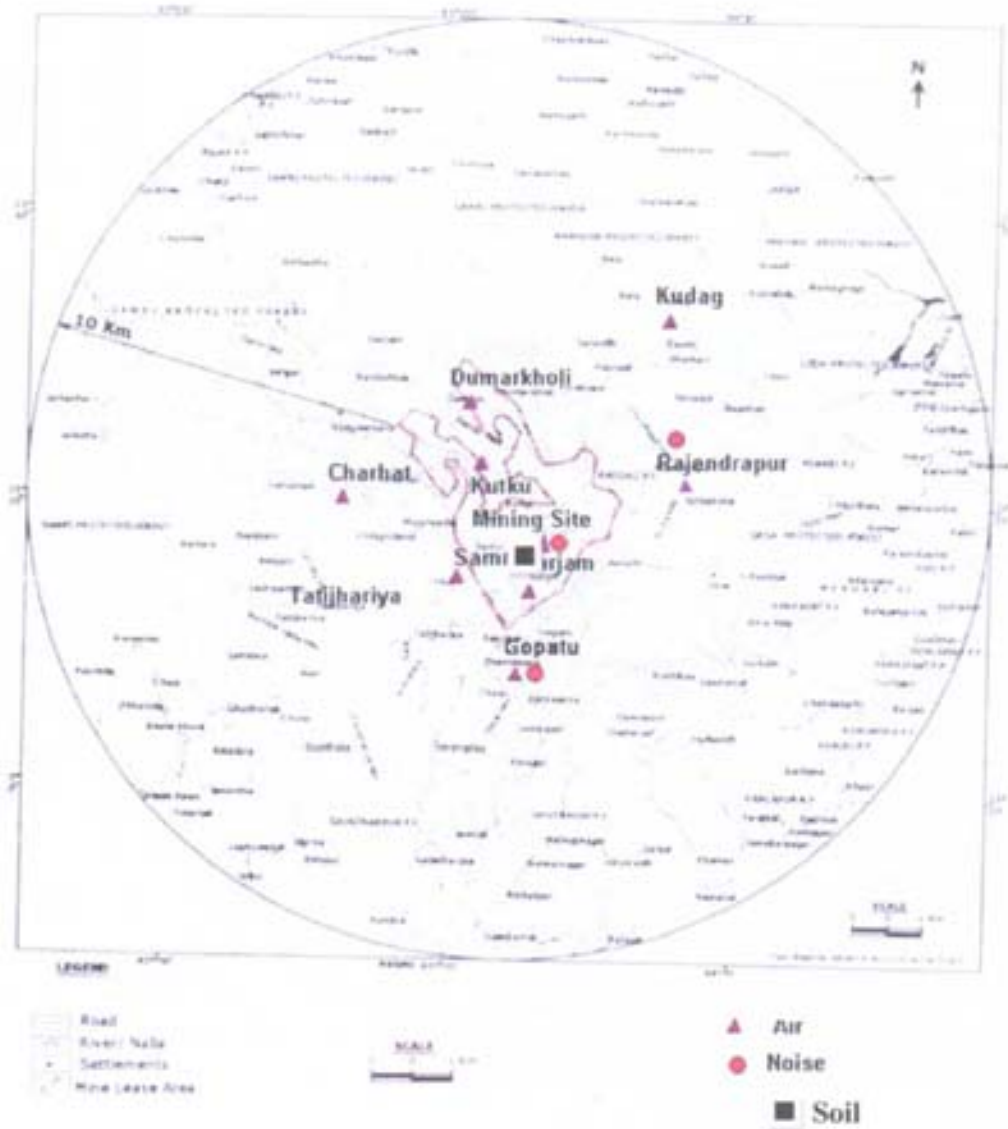


Fig 3: Sampling Locations for Air, Noise

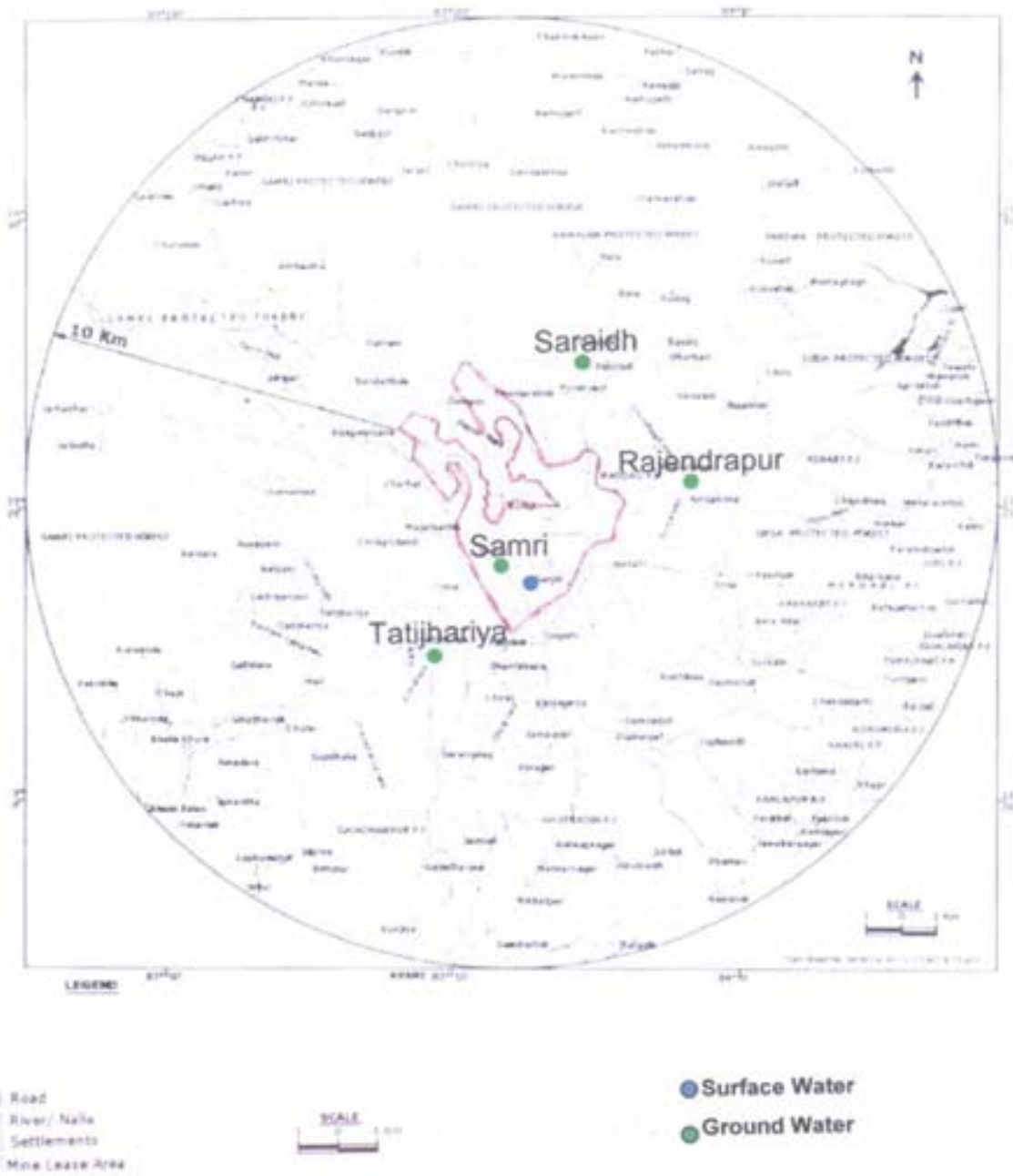


Fig 04: Sampling Locations for Water