



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 (January, February & March-2018) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment, Forest and Climate Change (MoEFCC) for Samri mining leases in Balrampur District, Chhattisgarh State.

1.2 Background Information of Samri Mine

HINDALCO was granted Samri Bauxite mining lease over an area of 2146.746 hec in Samri, Dumarkholi, Gopatu villages in Post Office & Tehsil Samri (Kusmi) of Balrampur district, Chhattisgarh on 24/06/1998 for a period of 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)**

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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 ⁰ 23' 02"N to 23 ⁰ 27' 05"N
3.	Longitude	83 ⁰ 53' 50"E to 83 ⁰ 57' 59"E
4.	Elevation	1140-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3 ⁰ C Annual minimum temperature : 17.7 ⁰ 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
(2146.746hec.)**

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 January-February-March-2018. The AAQM and Fugitive Emission sampling sites are selected considering seasonal variation in wind speed and wind direction.

Sampling Duration and Frequency

Ambient air quality monitoring and Fugitive Emission monitoring was carried out for the parameters PM_{2.5}, RPM (PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, NO_x Pb, Hg, As and Cr, from January-February-March-2018 as per CPCB norms. Sampling Duration and Frequency is given in (**Table 3**).

Data is compared with the present revised standards mentioned in the latest Gazette Notification of the Central Pollution Control Board (CPCB) 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 fibre filter paper and the bigger particulates from 10 to 100 µm are collected into the cup provided at the bottom of the cyclone. The dust deposited over the filter paper is measured as RPM and the smaller particulates from 2.5 µm are collected into the Membrane Filter Paper. The dust fall rate was measured using dust fall jar. The jar was exposed for one month in the mining area and Samri-Gopatu during pre and post monsoon period. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (0.02 N solutions) to prevent any growth of algae. The water level in the jar is constantly maintained in such a way that 2 lit of water is always retained. The measurement techniques used for various pollutants and other details are given in **(Table 4)**.

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

Earmarked samples were collected for Particulate Matter-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.**

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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/ m ³)
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

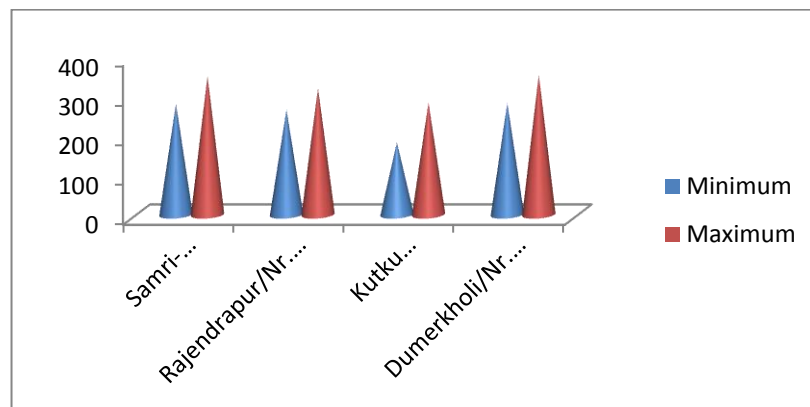
The summary of Fugitive Emission monitoring results for the month of January-February-March-2018 are presented in detail in **Table 6.0**. 98th percentile; maximum and minimum values etc. have been computed from the collected raw data for all the Fugitive monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQS for residential and rural zone.

1.6.1 Presentation of Results.

Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 182 $\mu\text{g}/\text{m}^3$ and 352 $\mu\text{g}/\text{m}^3$ respectively. The average concentrations were ranged between 193 to 330 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 204 to 351 $\mu\text{g}/\text{m}^3$ in the study area (**Table 6**).

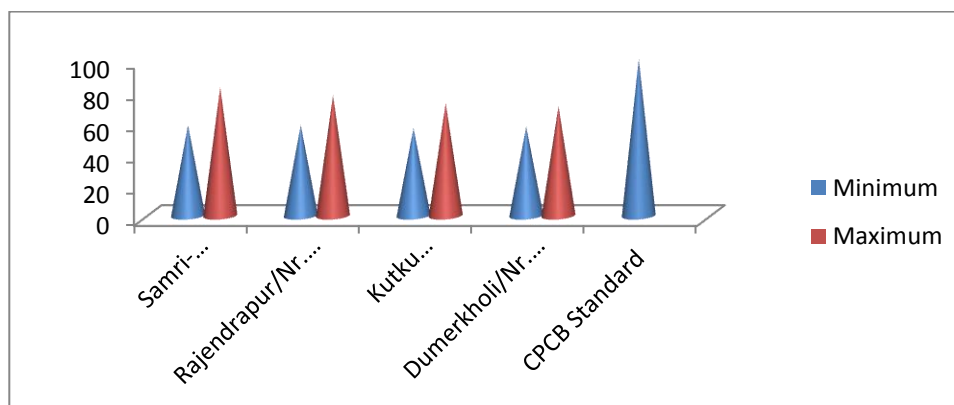
Graphical Presentation of Fugitive Emission SPM Monitoring



Respirable Suspended Particulate Matter –RSPM

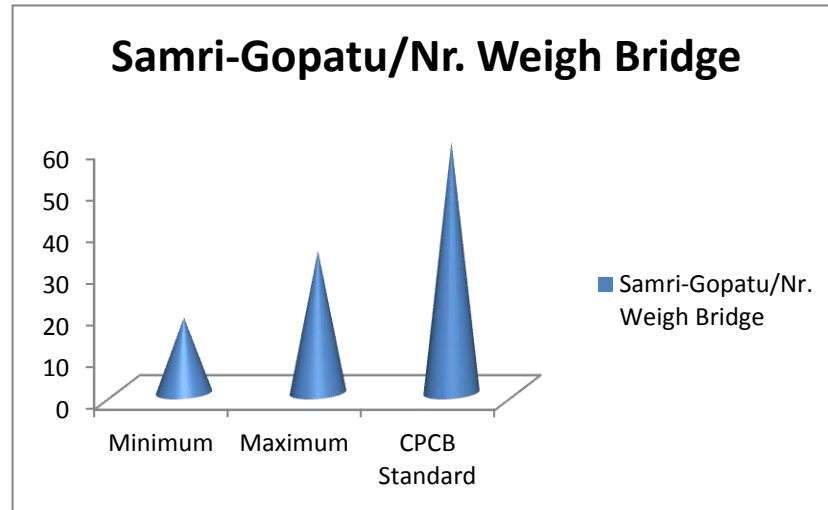
The minimum and maximum concentrations for RSPM were recorded as 56 $\mu\text{g}/\text{m}^3$ and 82 $\mu\text{g}/\text{m}^3$ respectively. The average values were observed to be in the range of 61 to 74 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 66 to 82 $\mu\text{g}/\text{m}^3$ in the study area (**Table 7**).

Graphical Presentation of Fugitive Emission RSPM Monitoring



Particulate Matter -PM_{2.5}

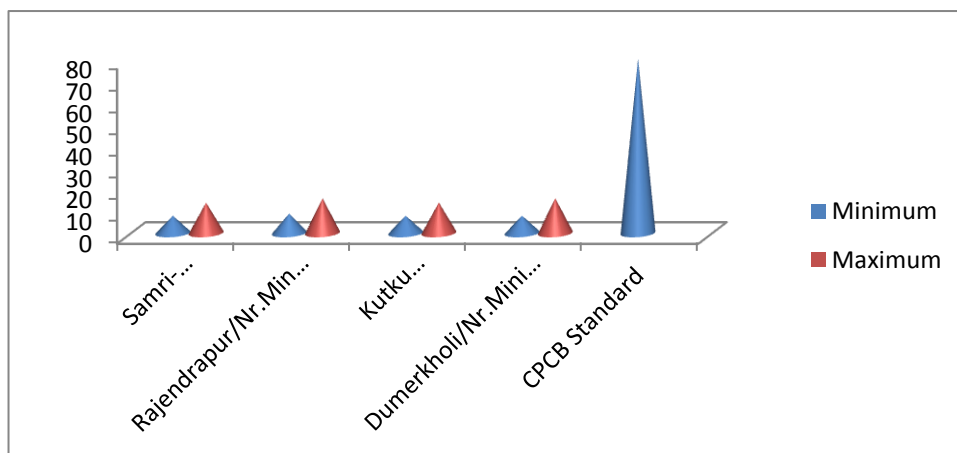
The minimum and maximum values of PM_{2.5} concentrations varied between 18 to 34µg/m³ respectively. The average values range between 23 to 30µg/m³ and 98th percentile values varied between 27 to 34µg/m³ (**Table 8**).



Sulphur Dioxide (SO₂)

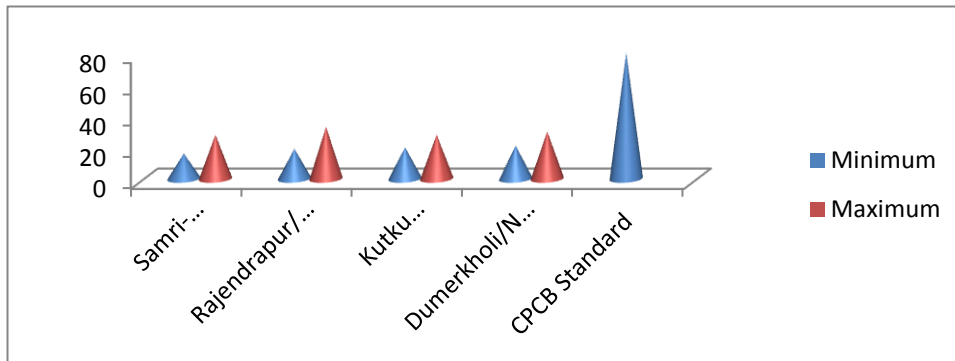
The minimum and maximum SO₂ concentrations were recorded as 8.0µg/m³ and 16µg/m³ respectively. The average values were observed to be in the range of 10 to 14 µg/m³ and 98th percentile values varied between 11 to 16.0µg/m³ (**Table 9**).

Graphical Presentation of Fugitive Emission SO₂ Monitoring



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 16.0µg/m³ and 33.0µg/m³. The average concentrations were ranged between 18.0 to 27.0µg/m³ and 98th percentile values varied between 20.0 to 33.0µg/m³ (**Table 10**).



Lead (Pb)

The maximum concentrations of Lead varied 0.077µg/m³ respectively. The average concentration varied 0.069µg/m³ & 98th percentiles values varied 0.077µg/m³ in the study region (**Table 11**).

Mercury (Hg)

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

Arsenic (As)

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

Chromium (Cr)

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

1.7 Ambient Air Quality (Buffer Zone)

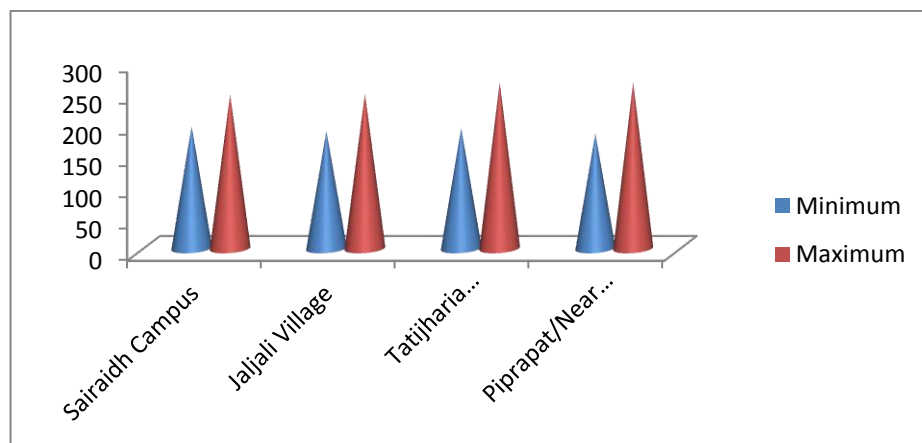
The background levels of SPM, RPM (PM₁₀), PM_{2.5}, SO₂, NO_x, Pb, Hg, As and Cr measured are required to compute Ambient Air Quality. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, Maximum concentration, Arithmetic mean (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 January-February-March-2018 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)/NAAQS for residential and rural zone.

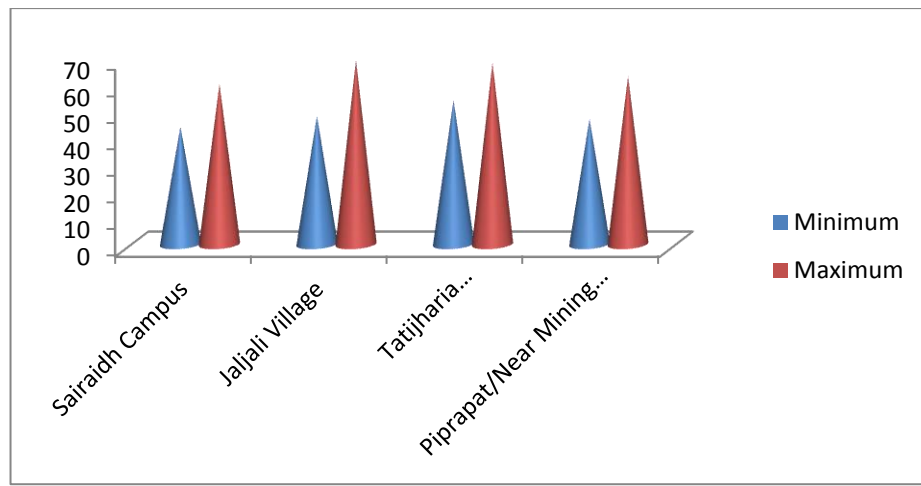
Suspended Particulate Matter-SPM

The statistical analysis of SPM is presented in **Table-6** for the mining area. The minimum and maximum values varied between 183 to 265µg/m³ respectively during study period at all the 4 locations. The average values ranged between 201 to 241µg/m³ and 98th percentile values ranged between 218 to 264µg/m³ in the study area.



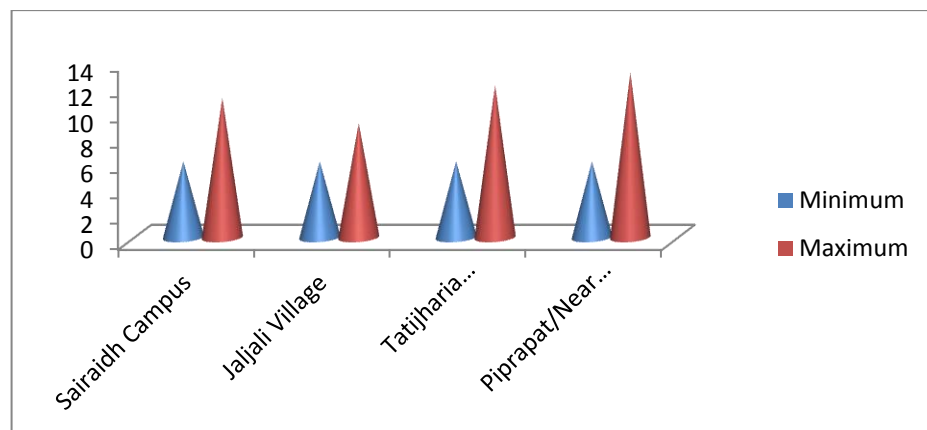
Particulate Matter-RSPM

The minimum and maximum values of RSPM varied between 44 to 69 $\mu\text{g}/\text{m}^3$ respectively (**Table 7**). The average values varied between 48 to 62 $\mu\text{g}/\text{m}^3$. The 98th percentile values varied between 51 to 69 $\mu\text{g}/\text{m}^3$ 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.



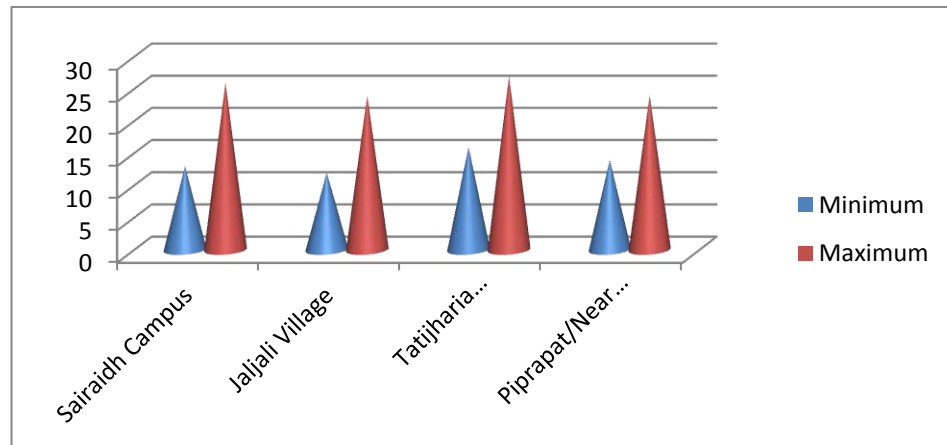
Sulphur Dioxide (SO₂)

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 7.0 to 10.0 $\mu\text{g}/\text{m}^3$ 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 27µg/m³ respectively. The average values range between 16 to 23µg/m³ and 98th percentile values varied between 18 to 27.0µg/m³ (**Table 10**).



Lead (Pb)

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

Mercury (Hg)

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

Arsenic (As)

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

Chromium (Cr)

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

The dust fall rate was measured by exposing a jar during January-February-March-2018 in Rajendrapur/Nr.Mining Area and Samri-Gopatu/Nr.Weigh Bridge. The dust fall rate was observed to be 22.46 and 20.24 MT/km²/month respectively as given in (**Table 14**).



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Overall the ambient air concentrations of SPM, RSPM, SO₂, 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.

Meteorology: Wind Pattern

The data of wind pattern collected during the study period (Jan-Feb-March-2018) indicates that the wind was blowing predominantly from (ENE and NNE) directions, during study period, for 2.08% wind was found to be calm. The details of wind pattern in the form of wind frequency distribution are presented in table-1. The graphical illustration and wind rose diagram is presented in Figures-1 & 2 respectively.

Table.1

Wind Frequency Distribution Data

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

SUMMARY OF WIND PATTERN

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

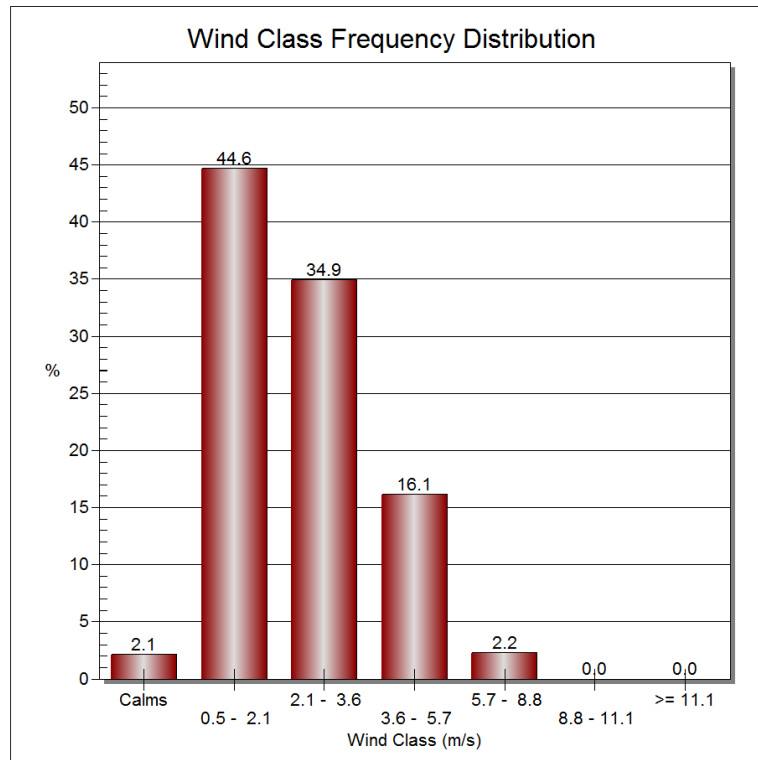


Figure.01: Wind Class Frequency Distribution (Jan-Feb-March-2018).

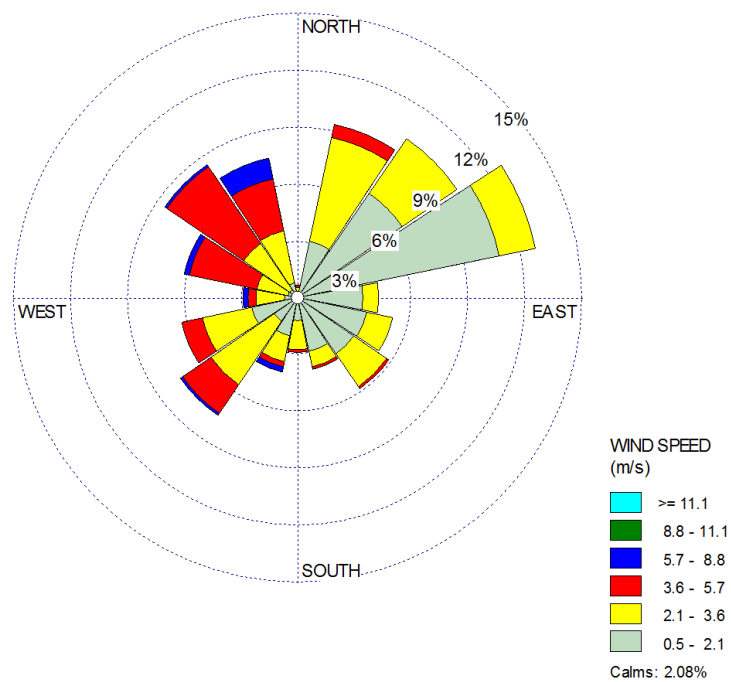


Figure.02: Wind Rose Diagram (Jan-Feb-March-2018)

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1.9 Noise Environment

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

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

Identification of sampling locations

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

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

Instrument used for monitoring

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

Method of Monitoring

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

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

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

2.0 Water Quality

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



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Table 6
Statistical Analysis of SPM

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	January-2018	279	307	293	293	306
	February-2018	281	316	299	299	315
	March-2018	304	349	327	327	348
Rajendrapur/ Nr.Mining Area	January-2018	271	308	290	290	307
	February-2018	264	291	278	278	290
	March-2018	276	318	297	297	317
Kutku Village/ Nr.V.T. Center	January-2018	241	267	254	254	266
	February-2018	259	282	271	271	282
	March-2018	182	204	193	193	204
Dumerkholi/ Nr.Mining Area	January-2018	281	301	291	291	301
	February-2018	292	317	305	305	317
	March-2018	308	352	330	330	351

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Buffer Zone :-						
Sairaidh Campus	January-2018	198	232	215	215	231
	February-2018	195	220	208	208	220
	March-2018	203	246	225	225	245
Jaljali Village	January-2018	187	247	217	217	246
	February-2018	198	225	212	212	224
	March-2018	217	247	232	232	246
Tatijharia Village/ Nr. Weigh bridge	January-2018	208	232	220	220	232
	February-2018	192	246	219	219	245
	March-2018	207	265	236	236	264
Piprapat/ Nr.Mining Area	January-2018	183	219	201	201	218
	February-2018	210	246	228	228	245
	March-2018	217	265	241	241	264

Conclusion-A:-

- 1) **Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone:** For the Months of Jan-Feb-March-2018 Average of SPM is $306 \mu\text{g}/\text{m}^3$.
 - 2) **Rajendrapur/Nr.Mining Lease Area Core Zone:-** For the Months of Jan-Feb-March-2018 Average of SPM is $288 \mu\text{g}/\text{m}^3$.
 - 3) **Kutku Village / Nr.V.T. Center Lease Area Core Zone:-** For the Months of Jan-Feb-March-2018 Average of SPM is $239 \mu\text{g}/\text{m}^3$.
 - 4) **Dumerkholi/ Nr.Mining Lease Area Core Zone:-** For the Months of Jan-Feb-March-2018 Average of SPM is $309 \mu\text{g}/\text{m}^3$.
- The Average Concentration of SPM within the core zone of Samri Lease is $286 \mu\text{g}/\text{m}^3$.

Conclusion-B:-

1. **Sairaidh Campus Lease Area Buffer zone:-** For the Months of Jan-Feb-Mar-2018 Average of SPM is $216 \mu\text{g}/\text{m}^3$.
 2. **Jaljali Village Lease Area Buffer zone:-** For the Months of Jan-Feb-Mar-2018 Average of SPM is $220 \mu\text{g}/\text{m}^3$.
 3. **Tatijharia Village/ Nr. Weigh bridge Buffer zone:-** For the Months of Jan-Feb-Mar-2018 Average of SPM is $225 \mu\text{g}/\text{m}^3$.
 4. **Piprapat/ Nr.Mining Area Buffer zone:-** For the Months of Jan-Feb-Mar-2018 Average of SPM is $223 \mu\text{g}/\text{m}^3$.
- The Average Concentration of SPM within the Buffer Zone of Samri Lease is $221 \mu\text{g}/\text{m}^3$.



Month-wise Summary of Statistical Analysis of SPM

3.0 Fugitive Emission (Core Zone):-

3.0.1 Presentation of Results.

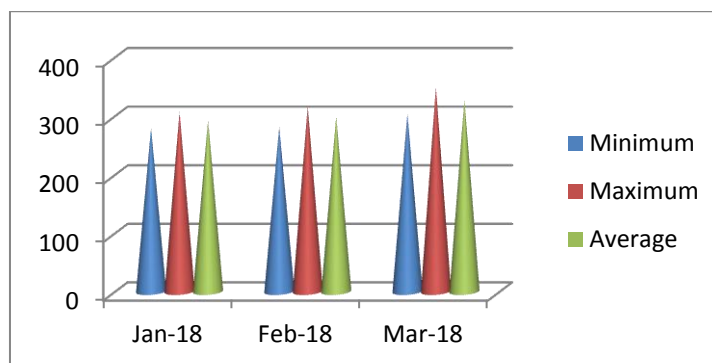
The summary of Statistical Analysis of SPM results for the month of January-February-March-2018 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as 279 $\mu\text{g}/\text{m}^3$ and 307 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 293 $\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as 281 $\mu\text{g}/\text{m}^3$ and 316 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 299 $\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as 304 $\mu\text{g}/\text{m}^3$ and 349 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 327 $\mu\text{g}/\text{m}^3$.



Graph :- Samri-Gopatu/ Nr.weigh bridge

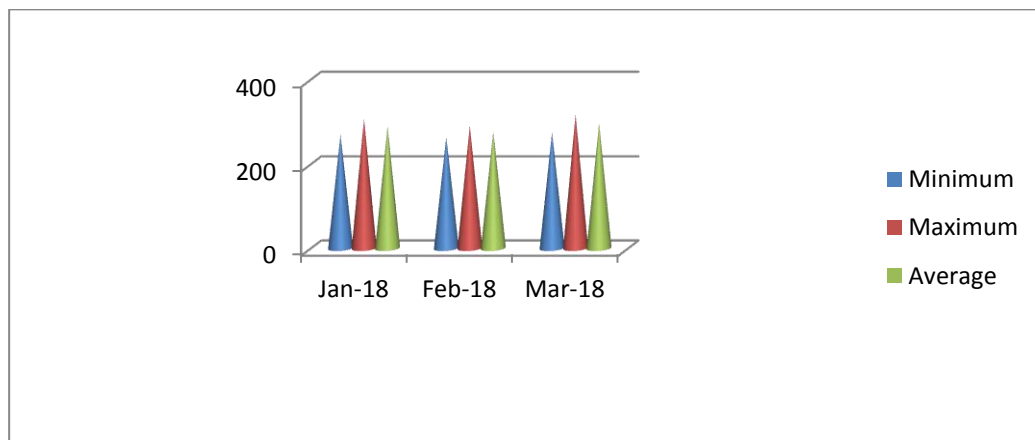


Rajendrapur/ Nr.Mining Area

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as $271\mu\text{g}/\text{m}^3$ and $308\mu\text{g}/\text{m}^3$ respectively and average concentration of $290\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as $264\mu\text{g}/\text{m}^3$ and $291\mu\text{g}/\text{m}^3$ respectively and average concentration of $278\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as $276\mu\text{g}/\text{m}^3$ and $318\mu\text{g}/\text{m}^3$ respectively and average concentration of $297\mu\text{g}/\text{m}^3$.



Graph: - Rajendrapur/ Nr.Mining Area

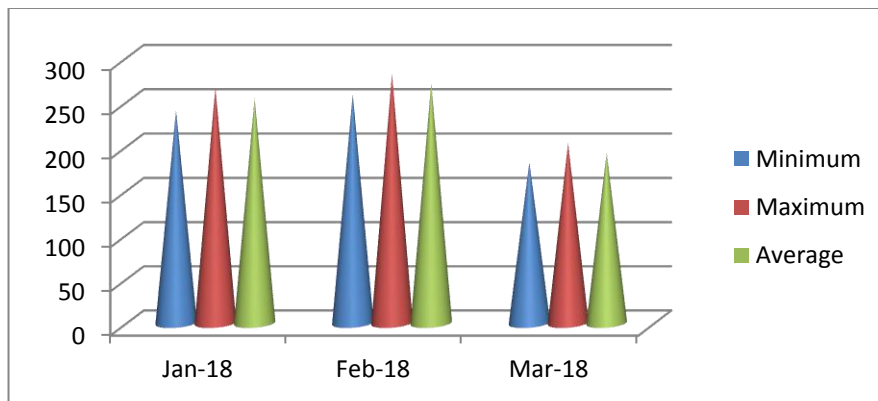


Kutku Village/ Nr.V.T. Center

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as $241\mu\text{g}/\text{m}^3$ and $267\mu\text{g}/\text{m}^3$ respectively and average concentration of $254\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as $259\mu\text{g}/\text{m}^3$ and $282\mu\text{g}/\text{m}^3$ respectively and average concentration of $271\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as $182\mu\text{g}/\text{m}^3$ and $204\mu\text{g}/\text{m}^3$ respectively and average concentration of $193\mu\text{g}/\text{m}^3$.



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

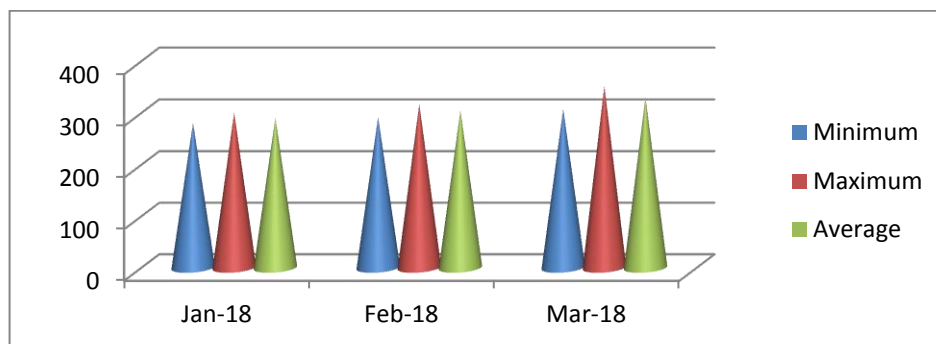


Dumerkholi/ Nr.Mining Area

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as $281\mu\text{g}/\text{m}^3$ and $301\mu\text{g}/\text{m}^3$ respectively and average concentration of $291\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as $292\mu\text{g}/\text{m}^3$ and $317\mu\text{g}/\text{m}^3$ respectively and average concentration of $305\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as $308\mu\text{g}/\text{m}^3$ and $352\mu\text{g}/\text{m}^3$ respectively and average concentration of $330\mu\text{g}/\text{m}^3$.



Graph:- Dumerkholi/ Nr.Mining Area



3.1 Fugitive Emission (Buffer Zone):-

3.1.1 Presentation of Results.

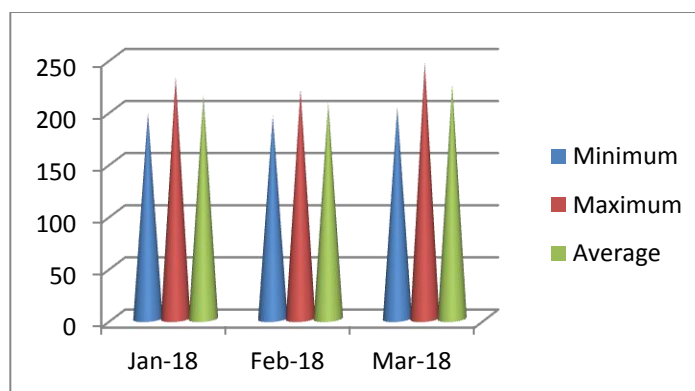
The summary of Statistical Analysis of SPM results for the month of January-February-March-2018 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as $198\mu\text{g}/\text{m}^3$ and $232\mu\text{g}/\text{m}^3$ respectively and average concentration of $215\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as $195\mu\text{g}/\text{m}^3$ and $220\mu\text{g}/\text{m}^3$ respectively and average concentration of $208\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as $203\mu\text{g}/\text{m}^3$ and $246\mu\text{g}/\text{m}^3$ respectively and average concentration of $225\mu\text{g}/\text{m}^3$.



Graph:- Sairaidh Campus

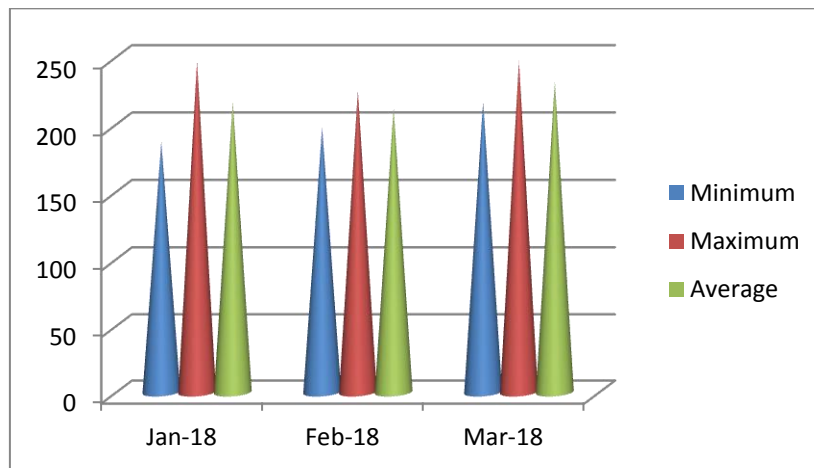


Jaljali Village

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as $187\mu\text{g}/\text{m}^3$ and $247\mu\text{g}/\text{m}^3$ respectively and average concentration of $217\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as $198\mu\text{g}/\text{m}^3$ and $225\mu\text{g}/\text{m}^3$ respectively and average concentration of $212\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as $217\mu\text{g}/\text{m}^3$ and $247\mu\text{g}/\text{m}^3$ respectively and average concentration of $232\mu\text{g}/\text{m}^3$.



Graph:- Jaljali Village

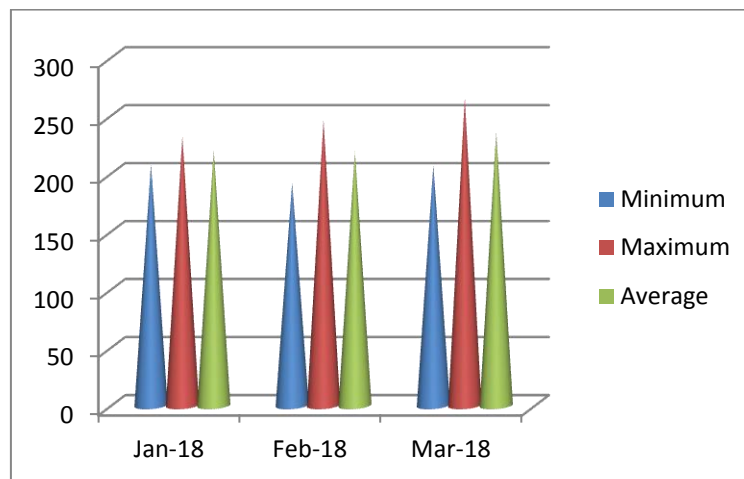


Tatijharia Village/Nr.Weigh Bridge

For the month of January-2018 the minimum and maximum concentrations for SPM were recorded as $208\mu\text{g}/\text{m}^3$ and $232\mu\text{g}/\text{m}^3$ respectively and average concentration of $220\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as $192\mu\text{g}/\text{m}^3$ and $246\mu\text{g}/\text{m}^3$ respectively and average concentration of $219\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as $207\mu\text{g}/\text{m}^3$ and $265\mu\text{g}/\text{m}^3$ respectively and average concentration of $236\mu\text{g}/\text{m}^3$.



Graph:- Tatijharia Village/Nr.Weigh Bridge

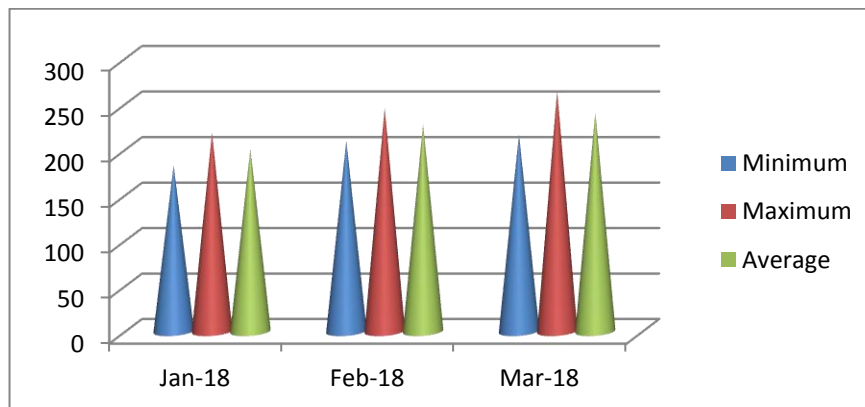


Piprapat/Nr.Mining Area

For the month of January-2018 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 $201\mu\text{g}/\text{m}^3$.

For the month of February-2018 the minimum and maximum concentrations for SPM were recorded as $210\mu\text{g}/\text{m}^3$ and $246\mu\text{g}/\text{m}^3$ respectively and average concentration of $228\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SPM were recorded as $217\mu\text{g}/\text{m}^3$ and $265\mu\text{g}/\text{m}^3$ respectively and average concentration of $241\mu\text{g}/\text{m}^3$.



Graph:- Piprapat/Nr.Mining Area

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Table 7
Statistical Analysis of RSPM

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	January-2018	65	82	74	74	82
	February-2018	58	73	66	66	73
	March-2018	61	81	71	71	81
Rajendrapur/ Nr.Mining Area	January-2018	63	69	66	66	69
	February-2018	65	77	71	71	77
	March-2018	58	66	62	62	66
Kutku Village/ Nr.V.T. Center	January-2018	60	72	66	66	72
	February-2018	56	70	63	63	70
	March-2018	58	67	63	63	67
Dumerkholi/ Nr.Mining Area	January-2018	62	70	66	66	70
	February-2018	57	64	61	61	64
	March-2018	60	68	64	64	68
CPCB Standard	100 (24 hrs)					

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Buffer Zone :-						
Sairaidh Campus	January-2018	44	53	49	49	53
	February-2018	48	60	54	54	60
	March-2018	45	51	48	48	51
Jaljali Village	January-2018	50	61	56	56	61
	February-2018	54	69	62	62	69
	March-2018	48	64	56	56	64
Tatijharia Village/ Nr. Weigh bridge	January-2018	54	57	56	56	57
	February-2018	58	63	61	61	63
	March-2018	56	68	62	62	68
Piprapat/ Nr.Mining Area	January-2018	52	61	57	57	61
	February-2018	48	63	56	56	63
	March-2018	47	53	50	50	53
CPCB Standard	100 (24 hrs)					

Conclusion: A)

- 1) **Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone:** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $70 \mu\text{g}/\text{m}^3$.
- 2) **Rajendrapur/Nr.Mining Area Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $66 \mu\text{g}/\text{m}^3$.
- 3) **Kutku Village / Nr.V.T. Center Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $64 \mu\text{g}/\text{m}^3$.
- 4) **Dumerkholi/ Nr.Mining Area Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $64 \mu\text{g}/\text{m}^3$.
 - The Average Concentration of RSPM within the Core Zone of Samri Lease is $66 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

• **Conclusion (B)**

- 1) **Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $50 \mu\text{g}/\text{m}^3$.
- 2) **Jaljali Village Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $58 \mu\text{g}/\text{m}^3$.
- 3) **Tatijharia Village/ Nr. Weigh bridge Buffer Zone:-** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $60 \mu\text{g}/\text{m}^3$.
- 4) **Piprapat/ Nr.Mining Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2018 Average of RSPM is $54 \mu\text{g}/\text{m}^3$.
 - The Average Concentration of RSPM within the Buffer Zone of Samri Lease is $56 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.



Monthwise Summary of Statistical Analysis of RSPM

3.2 Fugitive Emission (Core Zone):-

3.2.1 Presentation of Results.

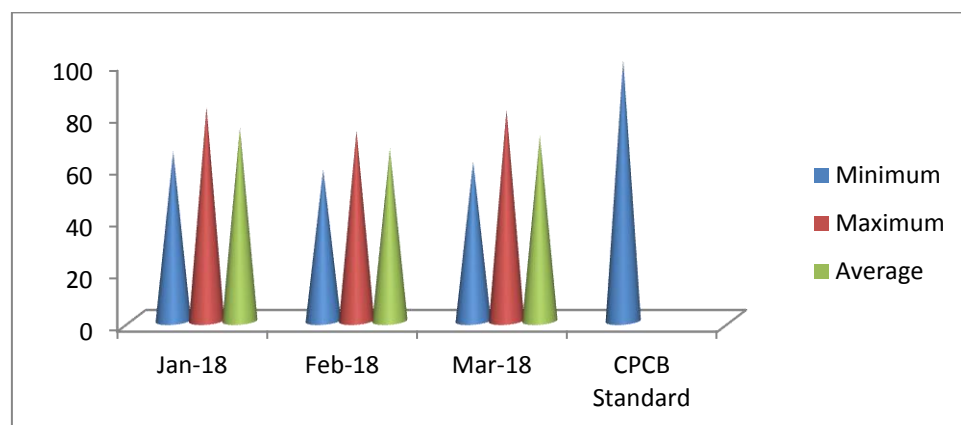
The summary of Statistical Analysis of RSPM results for the month of January-February-March-2018 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of January -2018 the minimum and maximum concentrations for RSPM were recorded as $65\mu\text{g}/\text{m}^3$ and $82\mu\text{g}/\text{m}^3$ respectively and average concentration of $74\mu\text{g}/\text{m}^3$.

For the month of February -2018 the minimum and maximum concentrations for RSPM were recorded as $58\mu\text{g}/\text{m}^3$ and $73\mu\text{g}/\text{m}^3$ respectively and average concentration of $66\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as $61\mu\text{g}/\text{m}^3$ and $81\mu\text{g}/\text{m}^3$ respectively and average concentration of $71\mu\text{g}/\text{m}^3$.



↓

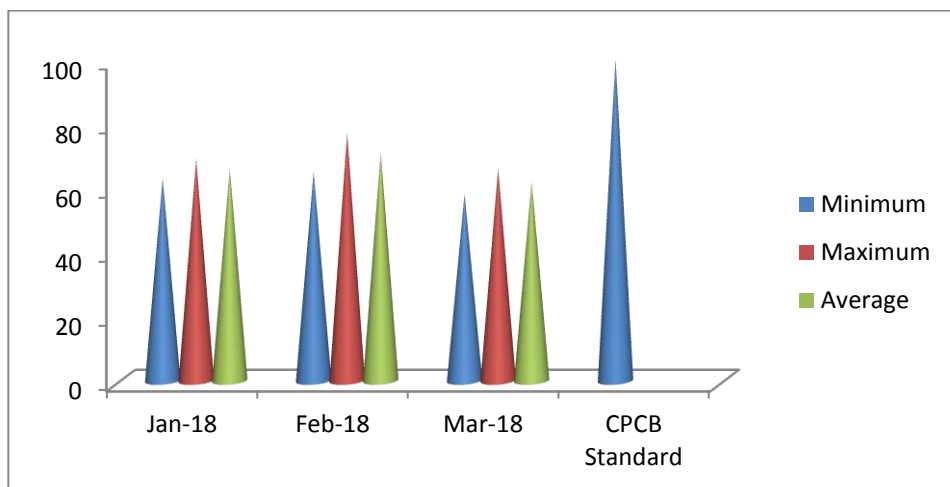


Rajendrapur/Nr.Mining Area

For the month of January -2018 the minimum and maximum concentrations for RSPM were recorded as $63\mu\text{g}/\text{m}^3$ and $69\mu\text{g}/\text{m}^3$ respectively and average concentration of $66\mu\text{g}/\text{m}^3$.

For the month of February -2018 the minimum and maximum concentrations for RSPM were recorded as $65\mu\text{g}/\text{m}^3$ and $77\mu\text{g}/\text{m}^3$ respectively and average concentration of $71\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as $58\mu\text{g}/\text{m}^3$ and $66\mu\text{g}/\text{m}^3$ respectively and average concentration of $62\mu\text{g}/\text{m}^3$.



Kutku Village/Nr.V.T. Center

For the month of January -2018 the minimum and maximum concentrations for RSPM were recorded as $60\mu\text{g}/\text{m}^3$ and $72\mu\text{g}/\text{m}^3$ respectively and average concentration of $66\mu\text{g}/\text{m}^3$.

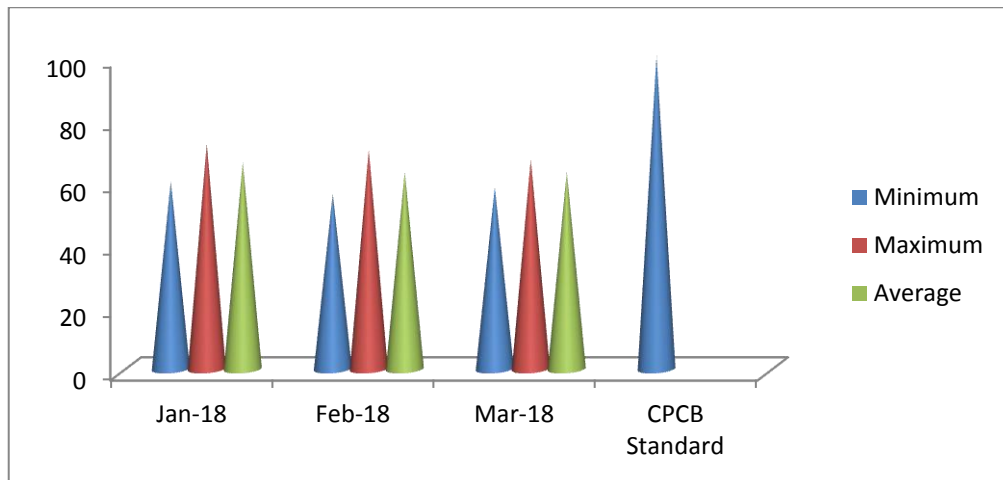
For the month of February -2018 the minimum and maximum concentrations for RSPM were recorded as $56\mu\text{g}/\text{m}^3$ and $70\mu\text{g}/\text{m}^3$ respectively and average concentration of $63\mu\text{g}/\text{m}^3$.

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



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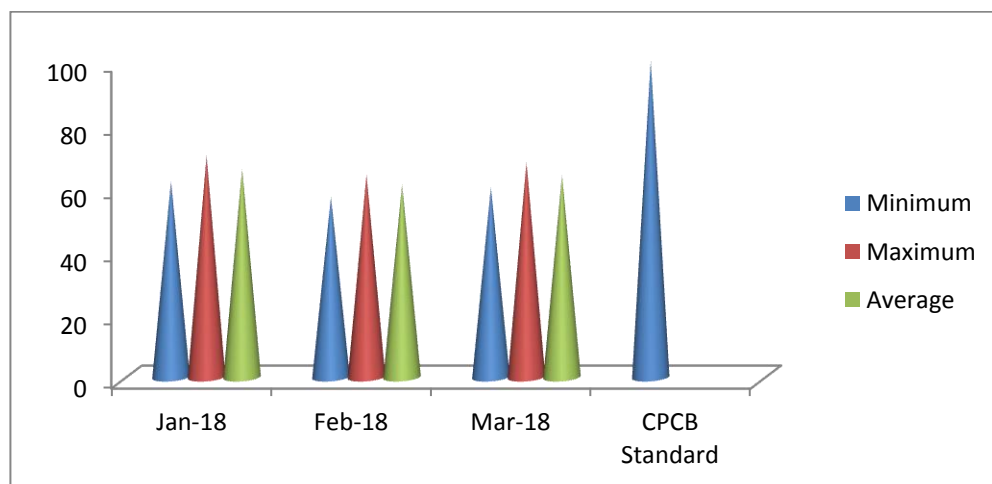


Dumerkholi/Nr.Mining Area

For the month of January -2018 the minimum and maximum concentrations for RSPM were recorded as $62\mu\text{g}/\text{m}^3$ and $70\mu\text{g}/\text{m}^3$ respectively and average concentration of $66\mu\text{g}/\text{m}^3$.

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

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as $60\mu\text{g}/\text{m}^3$ and $68\mu\text{g}/\text{m}^3$ respectively and average concentration of $64\mu\text{g}/\text{m}^3$.





3.3 Fugitive Emission (Buffer Zone):-

3.3.1 Presentation of Results.

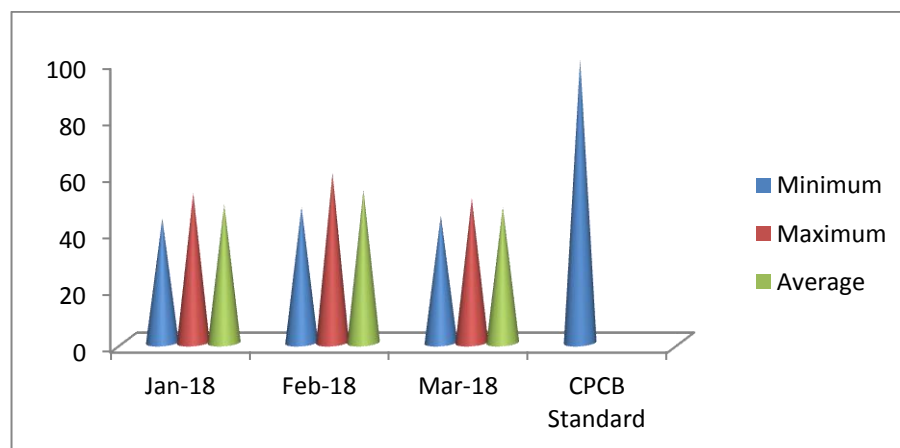
The summary of Statistical Analysis of RSPM results for the month of January-February-March-2018 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January -2018 the minimum and maximum concentrations for RSPM were recorded as $44\mu\text{g}/\text{m}^3$ and $53\mu\text{g}/\text{m}^3$ respectively and average concentration of $49\mu\text{g}/\text{m}^3$.

For the month of February -2018 the minimum and maximum concentrations for RSPM were recorded as $48\mu\text{g}/\text{m}^3$ and $60\mu\text{g}/\text{m}^3$ respectively and average concentration of $54\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as $45\mu\text{g}/\text{m}^3$ and $51\mu\text{g}/\text{m}^3$ respectively and average concentration of $48\mu\text{g}/\text{m}^3$.



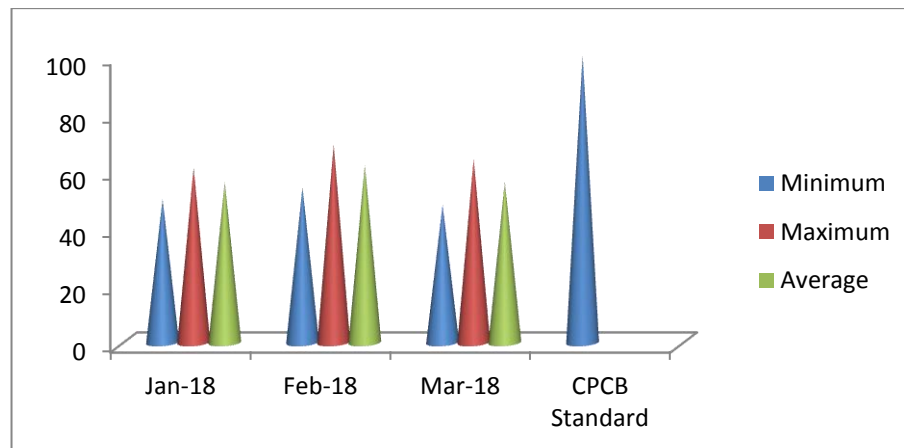


Jaljali Village

For the month of January -2018 the minimum and maximum concentrations for RSPM were recorded as $50\mu\text{g}/\text{m}^3$ and $61\mu\text{g}/\text{m}^3$ respectively and average concentration of $56\mu\text{g}/\text{m}^3$.

For the month of February -2018 the minimum and maximum concentrations for RSPM were recorded as $54\mu\text{g}/\text{m}^3$ and $69\mu\text{g}/\text{m}^3$ respectively and average concentration of $62\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as $48\mu\text{g}/\text{m}^3$ and $64\mu\text{g}/\text{m}^3$ respectively and average concentration of $56\mu\text{g}/\text{m}^3$.

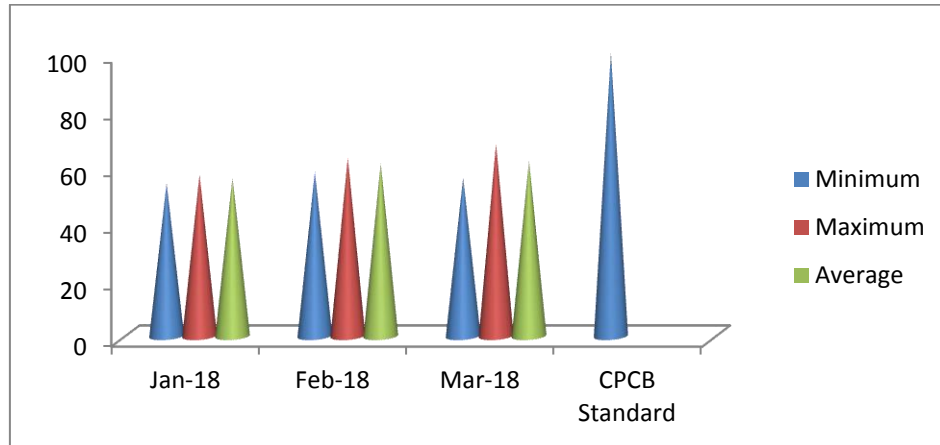


Tatijharia Village

For the month of January -2018 the minimum and maximum concentrations for RSPM were recorded as $54\mu\text{g}/\text{m}^3$ and $57\mu\text{g}/\text{m}^3$ respectively and average concentration of $56\mu\text{g}/\text{m}^3$.

For the month of February -2018 the minimum and maximum concentrations for RSPM were recorded as $58\mu\text{g}/\text{m}^3$ and $63\mu\text{g}/\text{m}^3$ respectively and average concentration of $61\mu\text{g}/\text{m}^3$.

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



Piprapat/Nr.Mining Area

For the month of January -2018 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 February -2018 the minimum and maximum concentrations for RSPM were recorded as $48\mu\text{g}/\text{m}^3$ and $63\mu\text{g}/\text{m}^3$ respectively and average concentration of $56\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for RSPM were recorded as $47\mu\text{g}/\text{m}^3$ and $53\mu\text{g}/\text{m}^3$ respectively and average concentration of $50\mu\text{g}/\text{m}^3$.

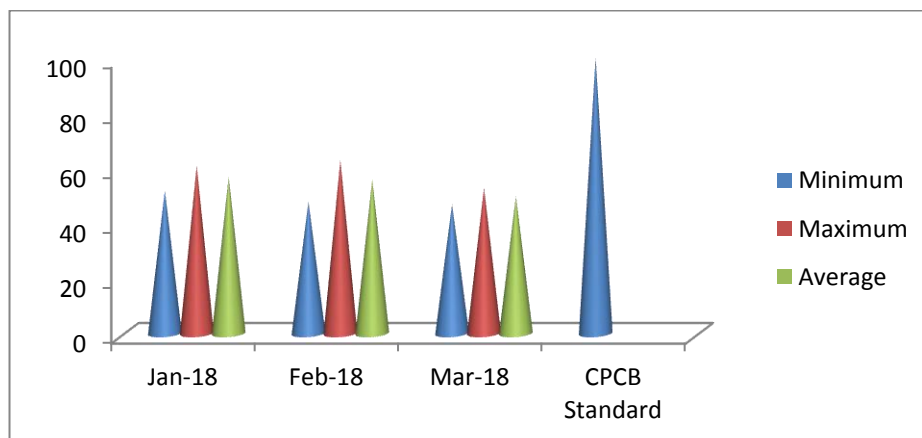


Table 8

Statistical Analysis of PM 2.5

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Samri-Gopatu/ Near Weigh bridge	January-2018	18	27	23	23	27
	February-2018	23	31	27	27	31
	March-2018	26	34	30	30	34
CPCB Standard		60 (24 hrs)				

Conclusion :- The Average Concentration of $\text{PM}_{2.5}$ within Samri Lease during this period (Jan-Feb-Mar-2018) is $27 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

3.4 Statistical Analysis of PM 2.5:-

3.4.1 Presentation of Results.

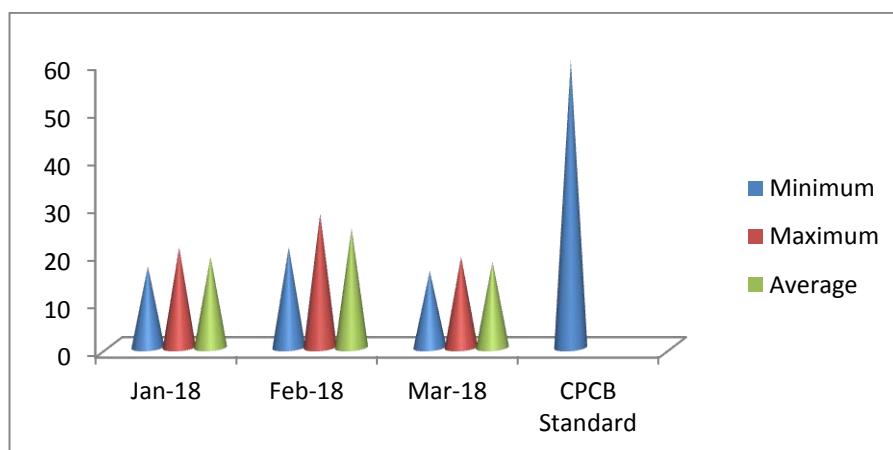
The summary of Statistical Analysis of $\text{PM}_{2.5}$ results for the month of January-February-March-2018 are presented in detail in Table 8. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/Near Weigh Bridge

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

For the month of February-2018 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $23\mu\text{g}/\text{m}^3$ and $31\mu\text{g}/\text{m}^3$ respectively and average concentration of $27\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $26\mu\text{g}/\text{m}^3$ and $34\mu\text{g}/\text{m}^3$ respectively and average concentration of $30\mu\text{g}/\text{m}^3$.



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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	January-2018	9	11	10	10	11
	February-2018	8	12	10	10	12
	March-2018	9	14	12	12	14
Rajendrapur/ Nr.Mining Area	January-2018	11	16	14	14	16
	February-2018	9	13	11	11	13
	March-2018	11	14	13	13	14
Kutku Village/ Nr.V.T. Center	January-2018	8	11	10	10	11
	February-2018	9	13	11	11	13
	March-2018	8	14	11	11	14
Dumerkholi/ Nr.Mining Area	January-2018	8	16	12	12	16
	February-2018	10	15	13	13	15
	March-2018	9	13	11	11	13
CPCB Standard				80 (24 hrs)		

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

Conclusion:- A)

- 1) **Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone:** For the Months of Jan-Feb-Mar-2018 Avg. of SO₂ is 11 µg/m³.
- 2) **Rajendrapur/Nr.Mining Area Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Avg. of SO₂ is 13 µg/m³.
- 3) **Kutku Village / Nr.V.T. Center Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Avg. of SO₂ is 11 µg/m³.
- 4) **Dumerkholi/ Nr.Mining Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Average of SO₂ is 12 µg/m³.
 - The Average Concentration of SO₂ within the Core Zone of Samri Lease during this period (Jan-Feb-Mar-2018) is 12 µg/m³ and it is within permissible limits as per CPCB Standard.

Conclusion : B)

- 1) **Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2018 Average of SO₂ is 8 µg/m³.
- 2) **Jaljali Village Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2018 Average of SO₂ is 8 µg/m³.
- 3) **Tatijharia Village/ Nr. Weigh bridge Lease Area Buffer Zone:-** For the Months of Oct- Jan-Feb-Mar-2018 Avg. of SO₂ is 9 µg/m³.
- 4) **Piprapat/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2018 Average of SO₂ is 9 µg/m³.
 - The Average Concentration of SO₂ within the Buffer Zone of Samri Lease during this period (Jan-Feb-Mar-2018) is 9 µg/m³ and it is within permissible limits as per CPCB Standard.



Monthwise Summary of Statistical Analysis of SO₂

3.5 Fugitive Emission (Core Zone):-

3.5.1 Presentation of Results.

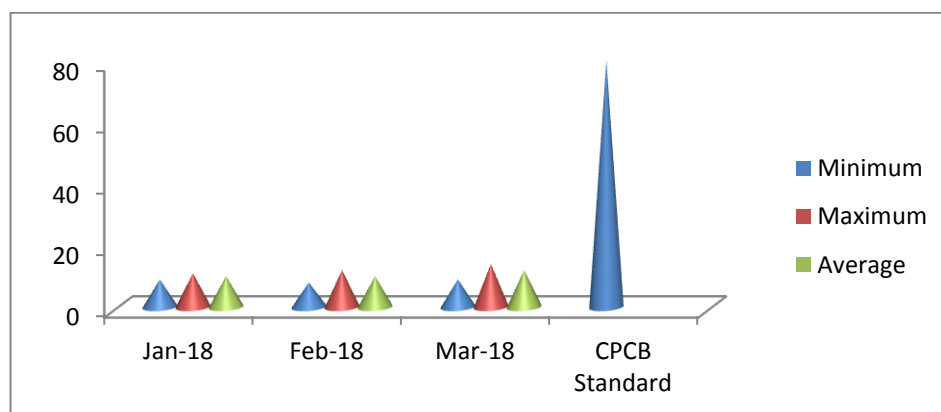
The summary of Statistical Analysis of SO₂ results for the month of January-February-March-2018 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Samri-Gopatu/ Nr.weigh bridge

For the month of January -2018 the minimum and maximum concentrations for SO₂ were recorded as 9µg/m³ and 11µg/m³ respectively and average concentration of 10µg/m³.

For the month of February -2018 the minimum and maximum concentrations for SO₂ were recorded as 8µg/m³ and 12µg/m³ respectively and average concentration of 10µg/m³.

For the month of March-2018 the minimum and maximum concentrations for SO₂ were recorded as 9µg/m³ and 14µg/m³ respectively and average concentration of 12µg/m³.



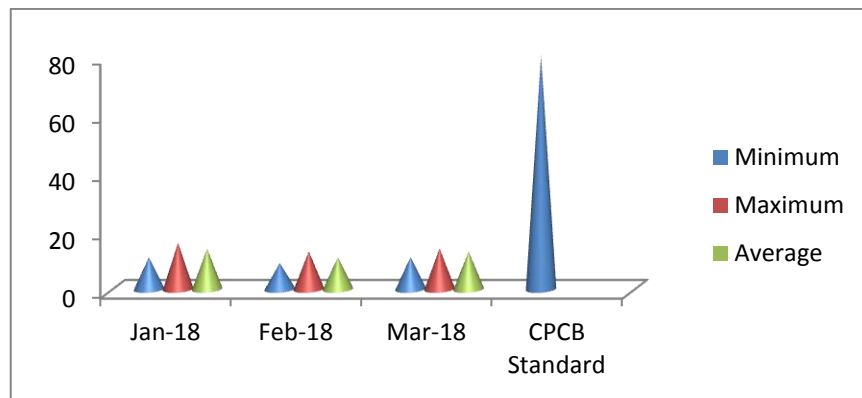
Rajendrapur/Nr.Mining Area

For the month of January -2018 the minimum and maximum concentrations for SO₂ were recorded as 11µg/m³ and 16µg/m³ respectively and average concentration of 14µg/m³.



For the month of February -2018 the minimum and maximum concentrations for SO₂ were recorded as 9µg/m³ and 13µg/m³ respectively and average concentration of 11µg/m³.

For the month of March-2018 the minimum and maximum concentrations for SO₂ were recorded as 11µg/m³ and 14µg/m³ respectively and average concentration of 13µg/m³.

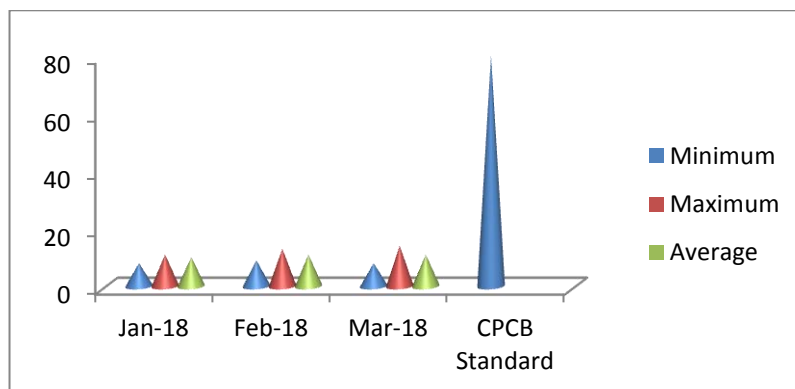


Kutku Village/Nr.V.T. Center

For the month of January -2018 the minimum and maximum concentrations for SO₂ were recorded as 8µg/m³ and 11µg/m³ respectively and average concentration of 10µg/m³.

For the month of February -2018 the minimum and maximum concentrations for SO₂ were recorded as 9µg/m³ and 13µg/m³ respectively and average concentration of 11µg/m³.

For the month of March-2018 the minimum and maximum concentrations for SO₂ were recorded as 8µg/m³ and 14µg/m³ respectively and average concentration of 11µg/m³.



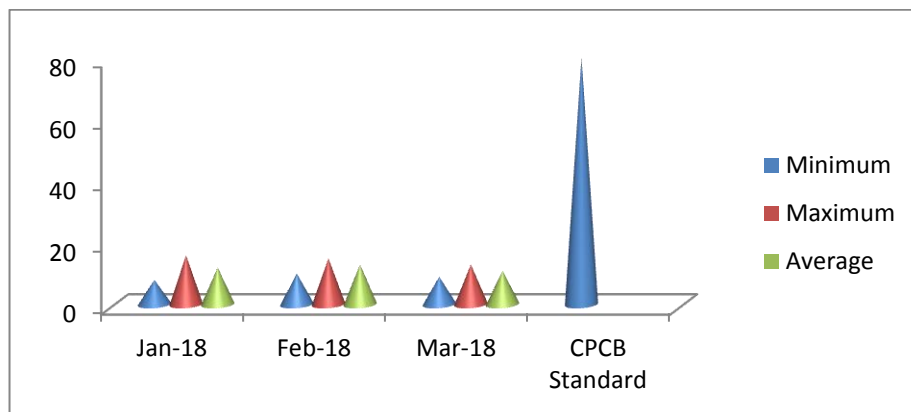


Dumerkholi/Nr.Mining Area

For the month of January -2018 the minimum and maximum concentrations for SO₂ were recorded as 8µg/m³ and 16µg/m³ respectively and average concentration of 12µg/m³.

For the month of February -2018 the minimum and maximum concentrations for SO₂ were recorded as 10µg/m³ and 15µg/m³ respectively and average concentration of 13µg/m³.

For the month of March-2018 the minimum and maximum concentrations for SO₂ were recorded as 9µg/m³ and 13µg/m³ respectively and average concentration of 11µg/m³.



3.6 Fugitive Emission (Buffer Zone):-

3.6.1 Presentation of Results.

The summary of Statistical Analysis of SO₂ results for the month of January-February-March-2018 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.

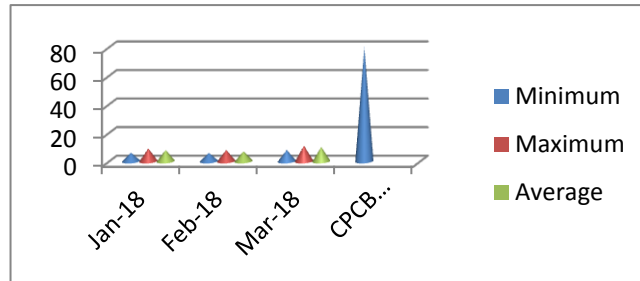
Sairaidh Campus

For the month of January -2018 the minimum and maximum concentrations for SO₂ were recorded as 6µg/m³ and 9µg/m³ respectively and average concentration of 8µg/m³.

For the month of February -2018 the minimum and maximum concentrations for SO₂ were recorded as 6µg/m³ and 8µg/m³ respectively and average concentration of 7µg/m³.



For the month of March-2018 the minimum and maximum concentrations for SO₂ were recorded as 8µg/m³ and 11µg/m³ respectively and average concentration of 10µg/m³.



Jaljali Village

For the month of January -2018 the minimum and maximum concentrations for SO₂ were recorded as 7µg/m³ and 9µg/m³ respectively and average concentration of 8µg/m³.

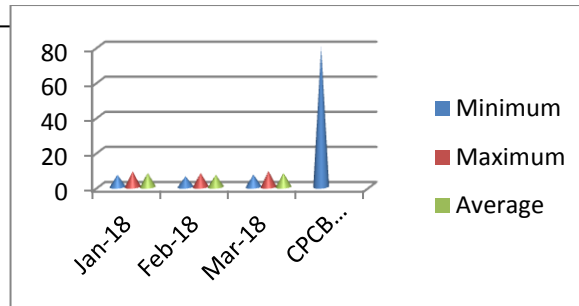
For the month of February -2018 the minimum and maximum concentrations for SO₂ were recorded as 6µg/m³ and 8µg/m³ respectively and average concentration of 7µg/m³.

For the month of March-2018 the minimum and maximum concentrations for SO₂ were recorded as 7µg/m³ and 9µg/m³ respectively and average concentration of 8µg/m³.



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Tatijharia Village/Nr.Weigh Bridge

For the month of January -2018 the minimum and maximum concentrations for SO_2 were recorded as $7\mu\text{g}/\text{m}^3$ and $11\mu\text{g}/\text{m}^3$ respectively and average concentration of $9\mu\text{g}/\text{m}^3$.

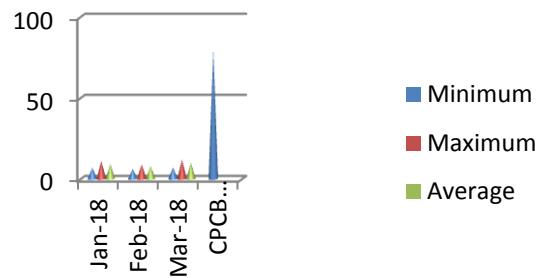
For the month of February -2018 the minimum and maximum concentrations for SO_2 were recorded as $6\mu\text{g}/\text{m}^3$ and $9\mu\text{g}/\text{m}^3$ respectively and average concentration of $8\mu\text{g}/\text{m}^3$.

For the month of March-2018 the minimum and maximum concentrations for SO_2 were recorded as $7\mu\text{g}/\text{m}^3$ and $12\mu\text{g}/\text{m}^3$ respectively and average concentration of $10\mu\text{g}/\text{m}^3$.



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Piprapat/Nr.Mining Area

For the month of January -2018 the minimum and maximum concentrations for SO₂ were recorded as 7µg/m³ and 13µg/m³ respectively and average concentration of 10µg/m³.

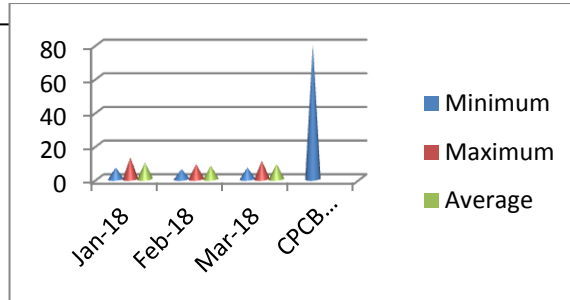
For the month of February -2018 the minimum and maximum concentrations for SO₂ were recorded as 6µg/m³ and 9µg/m³ respectively and average concentration of 8µg/m³.

For the month of March-2018 the minimum and maximum concentrations for SO₂ were recorded as 7µg/m³ and 11µg/m³ respectively and average concentration of 9µg/m³.



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**Table 10
Statistical Analysis of NO_x**

Unit: µg/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	January-2018	16	20	18	18	20
	February-2018	18	26	22	22	26
	March-2018	20	28	24	24	28
Rajendrapur/ Nr.Mining Area	January-2018	19	33	26	26	33
	February-2018	21	29	25	25	29
	March-2018	23	30	27	27	30
Kutku Village/ Nr.V.T. Center	January-2018	21	26	24	24	26
	February-2018	23	28	26	26	28
	March-2018	20	23	22	22	23
Dumerkholi/ Nr.Mining Area	January-2018	23	29	26	26	29
	February-2018	21	25	23	23	25
	March-2018	23	30	27	27	30
CPCB Standard		80 (24 hrs)				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Sairaidh Campus	January-2018	14	23	19	19	23
	February-2018	15	26	21	21	26
	March-2018	13	18	16	16	18
Jaljali Village	January-2018	12	19	16	16	19
	February-2018	14	22	18	18	22
	March-2018	14	24	19	19	24
Tatijharia Village/	January-2018	19	26	23	23	26

 HINDALCO ADITYA BIRLA GROUP Nr. Weigh bridge	Hindalco Industries Limited Samri Mining Environmental Status Report for January-2018 To March-2018				Introduction	
	February-2018	18	27	23	23	27
	March-2018	16	23	20	20	23
Piprapat/ Nr.Mining Area	January-2018	17	21	19	19	21
	February-2018	15	24	20	20	24
	March-2018	14	21	18	18	21
CPCB Standard		80 (24 hrs)				

Conclusion: A)

1) **Samri-Gopatu/ Nr.weigh bridge Lease Area Core Zone:** For the Months of Jan-Feb-Mar-2018 Average of NO_x is 21 µg/m³.

2) **Rajendrapur/Nr.Mining Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Average of NO_x is 26 µg/m³.

3) **Kutku Village / Nr.V.T. Center Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 Average of NO_x is 24 µg/m³.

4) **Dumerkholi/ Nr.Mining Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2018 of NO_x is 25 µg/m³.

- The Average Concentration of NO_x within the Core Zone of Samri Lease during this period (Jan-Feb-Mar-2018) is 24 µg/m³ and it is within permissible limits as per CPCB Standard.

Conclusion: B)

1) Sairaidh Campus Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2018 Average of NO_x is 19 µg/m³.

2) Jaljali Village Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2018 Average of NO_x is 18 µg/m³.

3) Tatiyharia Village/ Nr. Weigh bridge Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2018 Average of NO_x is 22 µg/m³.

4) Piprapat/ Nr.Mining Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2018 Average of NO_x is 19 µg/m³.

- The Average Concentration of NO_x within the Buffer Zone of Samri Lease during this period (Jan-Feb-Mar-2018) is 19 µg/m³ and it is within permissible limits as per CPCB Standard.

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 January-February-March-2018 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 January-2018 the minimum and maximum concentrations for NO_x were recorded as 16µg/m³ and 20µg/m³ respectively and average concentration of 18µg/m³.

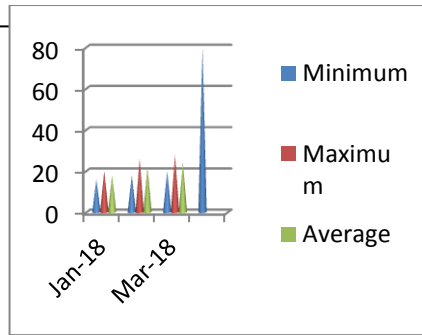
For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 18µg/m³ and 26µg/m³ respectively and average concentration of 22µg/m³.

For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 20µg/m³ and 28µg/m³ respectively and average concentration of 24µg/m³.



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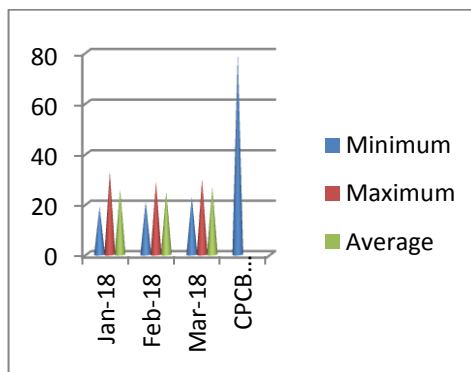


Rajendrapur/Nr.Mining Area

For the month of January-2018 the minimum and maximum concentrations for NO_x were recorded as 19µg/m³ and 33µg/m³ respectively and average concentration of 26µg/m³.

For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 21µg/m³ and 29µg/m³ respectively and average concentration of 25µg/m³.

For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 23µg/m³ and 30µg/m³ respectively and average concentration of 27µg/m³.



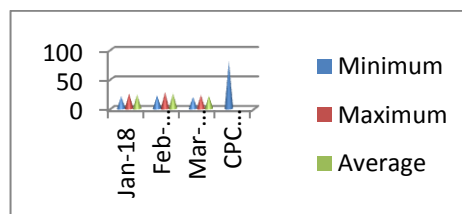


Kutku Village/Nr.V.T. Center

For the month of January-2018 the minimum and maximum concentrations for NO_x were recorded as 21µg/m³ and 26µg/m³ respectively and average concentration of 24µg/m³.

For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 23µg/m³ and 28µg/m³ respectively and average concentration of 26µg/m³.

For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 20µg/m³ and 23µg/m³ respectively and average concentration of 22µg/m³.



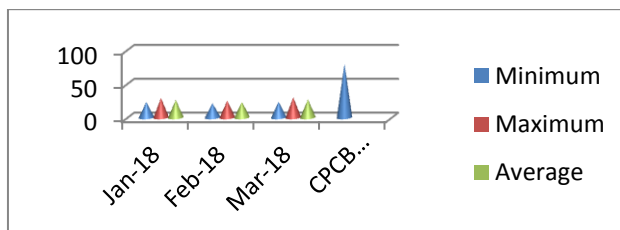


Dumerkholi/Nr.Mining Area

For the month of January-2018 the minimum and maximum concentrations for NO_x were recorded as 23µg/m³ and 29µg/m³ respectively and average concentration of 26µg/m³.

For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 21µg/m³ and 25µg/m³ respectively and average concentration of 23µg/m³.

For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 23µg/m³ and 30µg/m³ respectively and average concentration of 27µg/m³.





3.8 Fugitive Emission (Buffer Zone):-

3.8.1 Presentation of Results.

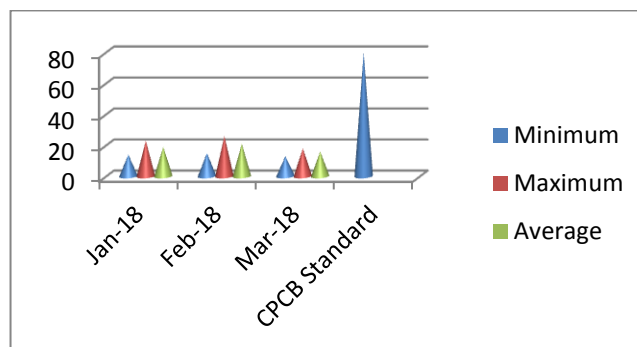
The summary of Statistical Analysis of NO_x results for the month of January-February-March-2018 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2018 the minimum and maximum concentrations for NO_x were recorded as 14µg/m³ and 23µg/m³ respectively and average concentration of 19µg/m³.

For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 15µg/m³ and 26µg/m³ respectively and average concentration of 21µg/m³.

For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 13µg/m³ and 18µg/m³ respectively and average concentration of 16µg/m³.



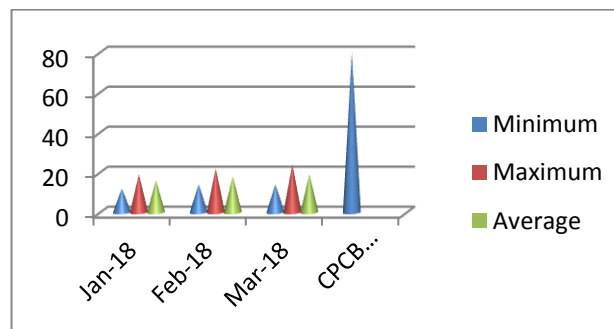


Jaljali Village

For the month of January-2018 the minimum and maximum concentrations for NO_x were recorded as 12µg/m³ and 19µg/m³ respectively and average concentration of 16µg/m³.

For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 14µg/m³ and 22µg/m³ respectively and average concentration of 18µg/m³.

For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 14µg/m³ and 24µg/m³ respectively and average concentration of 19µg/m³.



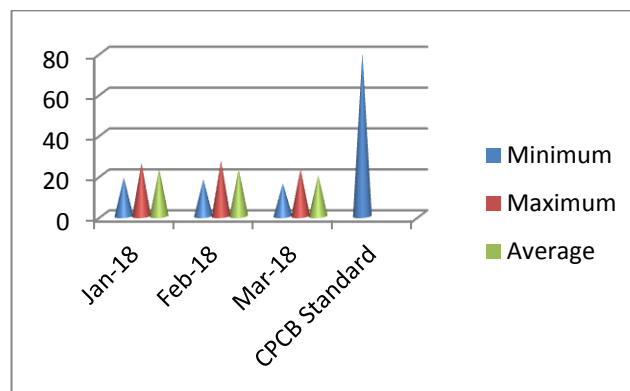


Tatijharia Village/Nr.Weigh Bridge

For the month of January-2018 the minimum and maximum concentrations for NO_x were recorded as 19µg/m³ and 26µg/m³ respectively and average concentration of 23µg/m³.

For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 18µg/m³ and 27µg/m³ respectively and average concentration of 23µg/m³.

For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 16µg/m³ and 23µg/m³ respectively and average concentration of 20µg/m³.



Piprapat/Nr.Mining Area



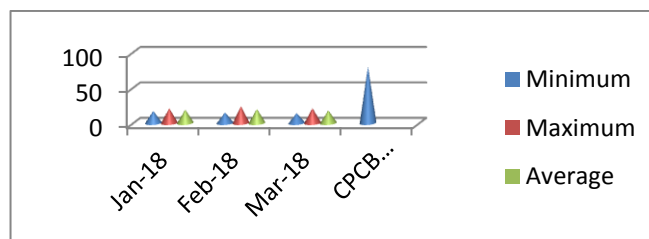
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For the month of January-2018 the minimum and maximum concentrations for NO_x were recorded as 17µg/m³ and 21µg/m³ respectively and average concentration of 19µg/m³.

For the month of February-2018 the minimum and maximum concentrations for NO_x were recorded as 15µg/m³ and 24µg/m³ respectively and average concentration of 20µg/m³.


For the month of March-2018 the minimum and maximum concentrations for NO_x were recorded as 14µg/m³ and 21µg/m³ respectively and average concentration of 18µg/m³.



**Table 11
Statistical Analysis of Pb**

Unit: µg/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	January-2018	0.055	0.070	0.063	0.063	0.070
	February-2018	0.060	0.077	0.069	0.069	0.077
	March-2018	0.049	0.068	0.059	0.059	0.068
Rajendrapur/	January-2018	0.046	0.055	0.051	0.051	0.055

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	Nr.Mining Area	February-2018	0.057	0.063	0.060	0.060
	March-2018	0.051	0.060	0.056	0.056	0.060
Kutku Village/ Nr.V.T. Center	January-2018	0.045	0.051	0.048	0.048	0.051
	February-2018	0.040	0.058	0.049	0.049	0.058
	March-2018	0.049	0.065	0.057	0.057	0.065
Dumerkholi/ Nr.Mining Area	January-2018	0.045	0.058	0.052	0.052	0.058
	February-2018	0.054	0.067	0.061	0.061	0.067
	March-2018	0.050	0.062	0.056	0.056	0.062
CPCB Standard	1.0 (24 hrs)					

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Sairaidh Campus	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Jaljali Village	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Tatijharia Village/ Nr. Weigh bridge	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Piprapat/ Nr.Mining Area	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
CPCB Standard	1.0 (24 hrs)					

Conclusion: A)

The Average Concentration of Pb within the Core Zone of Samri Lease during this period (January To March-2018) is 0.077 µg/m³ and it is within permissible limits as per CPCB Standard.

Conclusion: B)


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

Table 12

Statistical Analysis of Hg

Unit: µg/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%le
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Rajendrapur/	January-2018	ND	ND	ND	ND	ND

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	Nr.Mining Area	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND	
Kutku Village/ Nr.V.T. Center	January-2018	ND	ND	ND	ND	ND	
	February-2018	ND	ND	ND	ND	ND	
	March-2018	ND	ND	ND	ND	ND	
Dumerkholi/ Nr.Mining Area	January-2018	ND	ND	ND	ND	ND	
	February-2018	ND	ND	ND	ND	ND	
	March-2018	ND	ND	ND	ND	ND	

Buffer Zone :-						
Sairaidh Campus	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Jaljali Village	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Tatijharia Village/ Nr. Weigh bridge	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Piprapat/ Nr.Mining Area	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
CPCB Standard		----				

- ND-Not Detected.

Conclusion: A)


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

Conclusion: B)

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

Table 13
Statistical Analysis of As

Location	Month & Year	Min.	Max.	Unit: ng/m ³		
				A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Samri-Gopatu/ Nr.weigh bridge	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Rajendrapur/ Nr.Mining Area	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND

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		January-2018	ND	ND	ND	ND
Kutku Village/ Nr.V.T. Center	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
	January-2018	ND	ND	ND	ND	ND
Dumerkholi/ Nr.Mining Area	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
	06 (Annual)					
CPCB Standard						

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Sairaidh Campus	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Jaljali Village	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Tatijharia Village/ Nr. Weigh bridge	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
Piprapat/ Nr.Mining Area	January-2018	ND	ND	ND	ND	ND
	February-2018	ND	ND	ND	ND	ND
	March-2018	ND	ND	ND	ND	ND
CPCB Standard		06 (Annual)				

- ND-Not Detected.

Conclusion: A)

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

Conclusion: B)

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

Free Silica :-

Sr. No.	Location	Measurement Unit	January-2018		February-2018		March-2018	
			SPM	RSPM	SPM	RSPM	SPM	RSPM


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1.	Rajendrapur/ Near Mining Area	g/100gm	0.24	0.16	0.27	0.19	0.31	0.23

Table 14

Dust fall Rate


Sr. No.	Location	January-2018	February-2018	March-2018	Average
		Rate (MT/km ² /Month)			
1.	Rajendrapur/Nr.Mining Area	17.52	23.68	26.19	22.46
2.	Samri-Gopatu/Nr.Weigh Bridge	14.91	21.42	24.38	20.24

Table-15

Noise Level Monitoring

Unit: dB(A)

Sl. No.	Location	January-2018	February-2018	March-2018
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		Hindalco Industries Limited Samri Mining Environmental Status Report for January-2018 To March-2018				Introduction	
		Day	Night	Day	Night	Day	Night
Core Zone							
1.	Samri-Gopatu/Nr.Weigh Bridge	57	46	62	54	61	53
2.	Rajendrapur/Nr.Mining Area	59	48	57	46	56	41
3.	Kutku Village/Nr.V.T.Center	61	52	53	42	63	54
4.	Dumerkholi/Nr.Mining Area	54	46	58	43	52	47
Buffer Zone							
1.	Sairaidh Campus	46	38	52	41	48	39
2.	Jaljali Village	51	43	47	38	49	37
3.	Tatijharia Village/Nr.Weigh Bridge	53	41	51	42	46	38
4.	Piprapat/Near Mining Area	46	36	48	37	51	42

**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	January-2018			February-2018			March-2018		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1.	Rajendrapur/Nr .Mining Area	62.1	68.3	65.2	68.2	74.8	71.5	64.1	73.7	68.9

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 January-February-March-2018)**

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	7.38 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.6
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	1
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.21
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	304
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	116.94
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	102.73
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	168.14
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	54.18
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	7.96
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	42.51
17.	Nitrate (as NO ₃)	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	No relaxation	< 0.01
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	< 0.1

'<' 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



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29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.01
31.	Sulphide (as H 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	---	---	< 2
43.	<i>Escherichia coli</i>	Per100 ml	IS 1622	Absent	Absent	Absent

'<' indicates detection limit of the laboratory.

Contd.....

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

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

REMARKS: Based upon request of the party, sample was tested for above mentioned parameters only. 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 January-February-March-2018)



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Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	6.92 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	11.4
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	6
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.38
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	439
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.64
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	176.28
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	124.52
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	241.86
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	73.81
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	13.96
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	146.52
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	9.27
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	<0.05
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation	< 0.0005
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.001
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
23.	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.01
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	1.8

'<' indicates detection limit of the laboratory.

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(Contd.....)

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable	*Permissible	



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				Limit	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	< 0.01
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	0.17
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform			0.1	No relaxation	Absent
	b. Dibromochloromethane	mg/l	APHA 6232	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
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	---	---	1600
43.	<i>Escherichia coli</i>	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
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**Hindalco Industries Limited
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44. Pesticides residues					
i	Alpha-HCH	µg/l	USEPA 508	0.01	< 0.01
.	Beta HCH	µg/l	USEPA 508	0.04	< 0.03
.	Delta- HCH	µg/l	USEPA 508	0.04	< 0.03
.	Alachlor	µg/l	USEPA 508	20	< 0.03
.	Aldrin / Dieldrin	µg/l	USEPA 508	0.03	< 0.03
.	Atrazine	µg/l	USEPA 1657	2	< 0.03
.	Butachlor	µg/l	USEPA 508	125	< 0.03
.	Chlorpyrifos	µg/l	USEPA 1657	30	< 0.03
.	DDT and its Isomers	µg/l	USEPA 508	1	< 0.03
.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2	< 0.03
.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30	< 0.03
.	Endosulphan	µg/l	USEPA 508	0.4	< 0.03
.	Ethion	µg/l	USEPA 1657	3	< 0.03
.	Isoproturon	µg/l	USEPA 1657	9	< 0.03
.	Malathion	µg/l	USEPA 1657	190	< 0.03
.	Methyl Parathion	µg/l	USEPA 1657	0.3	< 0.03
.	Monocrotophos	µg/l	USEPA 1657	1	< 0.03
.	Phorate	µg/l	USEPA 1657	2	< 0.03

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


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

Table 18

Soil Analysis Report

Date of collection: March-2018

Sr. No	Test Parameters	Measurement Unit	Results
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		Hindalco Industries Limited Samri Mining Environmental Status Report for January-2018 To March-2018		Introduction	
				Rajendrapur/Nr.Mining Area	
1	pH	-		6.81 at 25 ^o C	
2	Electrical Conductivity at 25 ^o C	μS/cm		382	
3	Texture	-		Silty clay	
4	Sand	%		41.6	
5	Silt	%		37.1	
6	Clay	%		21.3	
7	Bulk Density	g/cc		1.21	
8	Porosity	%		28	
9	Water Holding Capacity	%		48	
10	Exchangeable Calcium as Ca	mg/kg		18.54	
11	Exchangeable Magnesium as Mg	mg/kg		8.29	
12	Exchangeable Sodium as Na	mg/kg		27.42	
13	Available Potassium as K	kg/ha.		32.91	
14	Available Phosphorous as P	kg/ha.		41.68	
15	Available Nitrogen as N	kg/ha.		218.52	
16	Organic Matter	%		0.17	
17	Organic Carbon	%		0.11	
18	Water Soluble Chloride as Cl ⁺	mg/kg		23.68	
19	Water Soluble Sulphate as SO ₄	mg/kg		8.7	
20	Sodium Absorption Ratio	-		7.52	
21	CEC	meq/100 gm		12.4	
22	Total Iron	%		6.8	
23	Available Manganese	mg/kg		0.09	
24	Available Zinc	mg/kg		0.013	
25	Available Boron	mg/kg		0.008	

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'.

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



**Hindalco Industries Limited
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Introduction

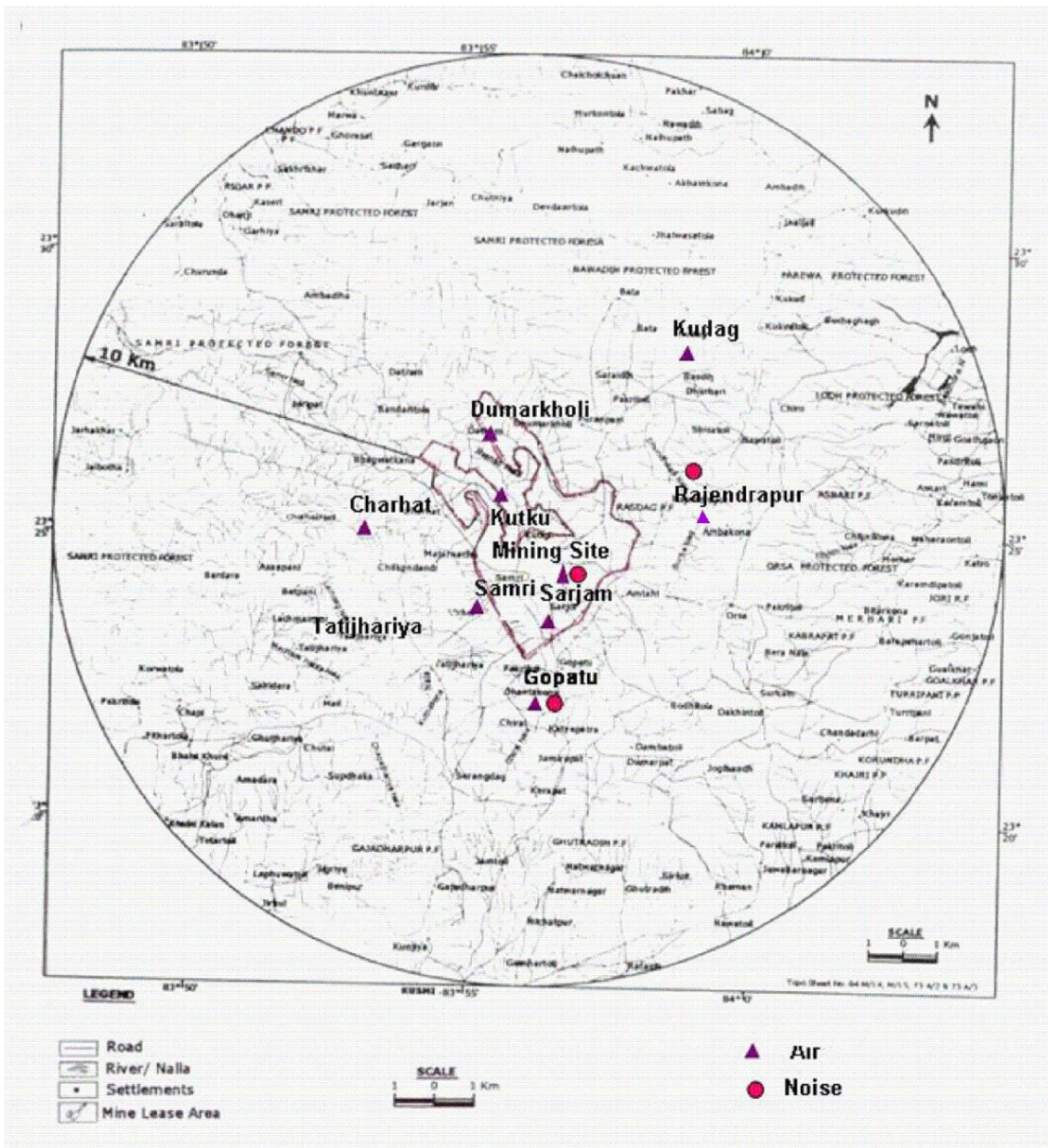
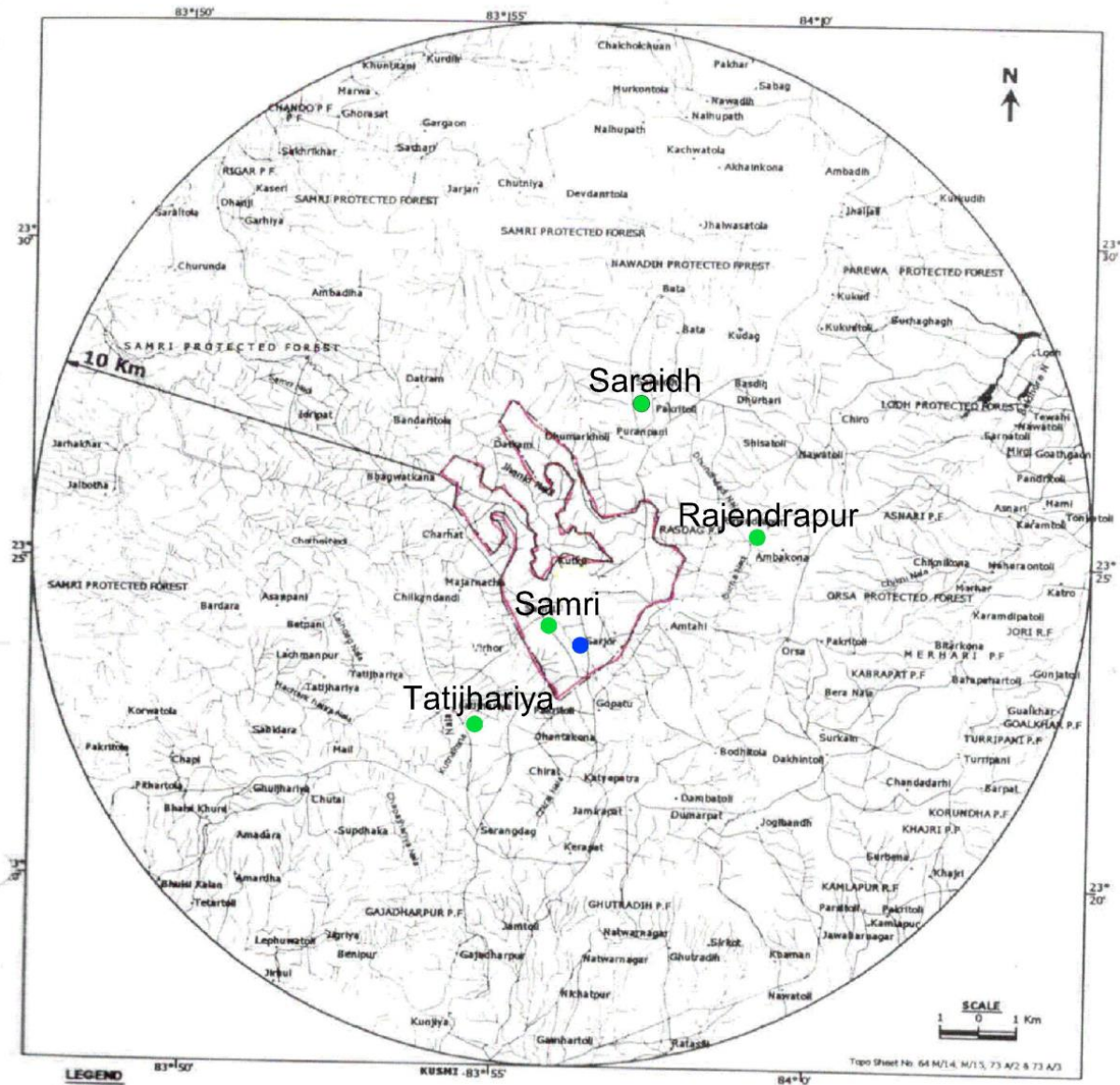


Fig 3: Sampling Locations for Air, Noise

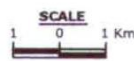


**Hindalco Industries Limited
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Introduction



- Road
- River/ Nalla
- Settlements
- Mine Lease Area



- Surface Water
- Ground Water

Fig 04: Sampling Locations for Water