

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

Duration: July-August-September-2018

Name of Industry



Rajendra Singh
Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

M/s. Hindalco Industries Limited.,

Name of Laboratory:-



Recognised by MoEF (GOI) Notifn. No. D.L.33004/99 Dt.24.10.2007
NABL T-1550 (Chemical), T-1826 (Biological), T-2344 (Mechanical) dt.04/10/2016 valid up to 03.10.2018
Accredited under the QCI-NABET Scheme for EIA Consultant
BIS vide No.CL/CQAPD/OSL (7124116) dt.16.12.2011
Certified by ISO 9001:2008, ISO 14001:2004, ISO 18001:2007
Head Office: 60, Bajiprabhu Nagar, Nagpur-440 033, MS
Lab. : FP-34, 35, Food Park, MIDC, Butibori, Nagpur – 441122
Ph.: (0712) 2242077, 9373287475 Fax: (0712) 2242077
Email: labngp@anacon.in
info@anacon.in
Website: www.anaconlaboratories.com,

Foreword

The protection of environment plays a crucial role in maintaining the local environment quality for any mining industry. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding the mine area. Therefore, environment protection is becoming a pre requisite 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-2018 to September-2018** as compliance to the statutory requirements.

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

for **ANACON LABORATORIES PVT. LTD.**

Place : Nagpur

Date : September, 2018



A handwritten signature in blue ink, appearing to read "Dhanu".

Authorized Signatory



1.1 Introduction

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

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

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

1.2 Background Information of Kudag Mine

Hindalco was granted Kudag Bauxite mining lease over an area of 377.116 hec. in Kudag village in Post office Dumarkholi, Tehsil Samri(Kusmi) of Balrampur district, Chhattisgarh on 24/12/1996 for a period of **50** years. The mining operations were started on 02/07/1997. The production capacity of Bauxite is 0.6 Lakh Tonnes Per Annum (LTPA).

1.3 Salient Features of Kudag Bauxite Mine

The deposits occur in Kudag block, Post office Dumarkholi Tehsil Samri(Kusmi) of Balrampur district. This deposit has been identified as one of the resources to cater the raw material requirements of the Hindalco Alumina refinery at Renukoot, Uttar Pradesh. The salient features of the project are presented below : (**Table1**).



Table 1

Salient Features of Kudag Bauxite Mines

S.No.	Particulars	Details
1.	Survey of India Toposheet No.	64 M /15
2.	Latitude	23 ^o 26' 02"N to 23 ^o 29' 00"N
3.	Longitude	83 ^o 51' 00"E to 83 ^o 59' 00"E
4.	Elevation	1145-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	377.116 Hec.
7.	Method of mining	Open cast (Semi-Mechanized)
8.	Mode of transportation	Trucks
9.	Landuse	Agricultural and Barren land
10.	Nearest Road	Samri to Kusmi (17 km)
11.	Nearest Airport	Ranchi Airport (151.09 km)
12.	Nearest Town	Ambikapur (127 km, SW)

1.4 Environmental Monitoring

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

In order to find out the impact of mining activity on sensitive receptors, it is necessary to monitor Environmental Quality to know the level of concentrations of pollutants within and around the mining lease area. Accordingly Hindalco Industries through ALPL has been monitoring air, water and noise quality on monthly basis during these months (**Table-2**).



1.5 Air Environment

1.5.1 Ambient Air Quality Monitoring

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

Table 2

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

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

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the mining site. ALPL is carrying out regular monitoring for $PM_{2.5}$, RPM(PM_{10}), SO_2 , NO_x and SPM, RSPM, SO_2 , NO_x , Pb, Hg, As and Cr at above Ambient Air Quality Monitoring (AAQM) locations and Fugitive Emission. The dust fall rate was measured in the mining area and Khaskudag during July-August-September-2018. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

Sampling Duration and Frequency

Ambient air quality monitoring was carried out for the parameters $PM_{2.5}$, RPM (PM_{10}), SO_2 , NO_x and SPM, RSPM, SO_2 , NO_x , Pb, Hg, As and Cr from July-August-September-2018 as per CPCB norms. Sampling conducted duration and Frequency is given in **(Table 3)**.

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

MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

Methods and Instruments used for Sampling

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

The levels of Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur Dioxide (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 Chowk during pre and post monsoon period. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (0.02 N solutions) to prevent any growth of algae. The water level in the jar is constantly maintained in such a way that 2 lit of water is always retained. The measurement techniques used for various pollutants and other details are given in **(Table 4)**.

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

Earmarked samples were collected for Particulate Matter-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-4.0**



Table-3.0

Parameters	Sampling frequency
Suspended Particulate Matter	24 hourly sample twice a week for Three months
Respirable Particulate Matter	24 hourly sample twice a week for Three months
Particulate Matter 2.5	24 hourly sample twice a week for Three months
Sulphur dioxide (SO 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.	Mercury (Hg)	By Cold Vapor atomic Absorption	IS-5182 (Part-I)	0.001
8.	Dust Full	Gravimetric	IS-5182 (Part-I)	—



1.6 Fugitive Emission Monitoring (Core Zone)

The summary of Fugitive Emission monitoring results for the month of July-August-September-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.

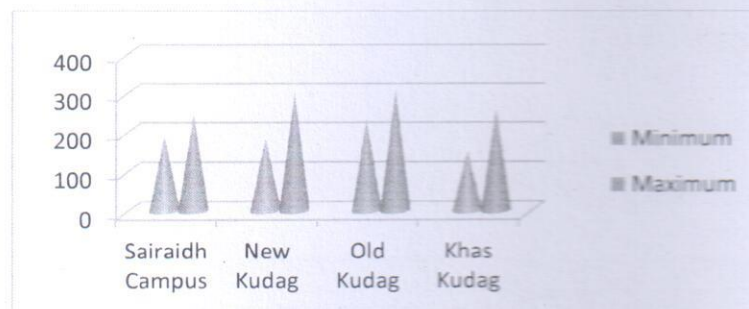
1.6.1 Presentation of Results.

Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as $153\mu\text{g}/\text{m}^3$ and $311\mu\text{g}/\text{m}^3$ respectively. The average concentrations were ranged between 169 to $289\mu\text{g}/\text{m}^3$, and 98th percentile values ranged between 183 to $310\mu\text{g}/\text{m}^3$ in the study area (**Table 6**).

Graphical Presentation of Fugitive Emission Monitoring

SPM



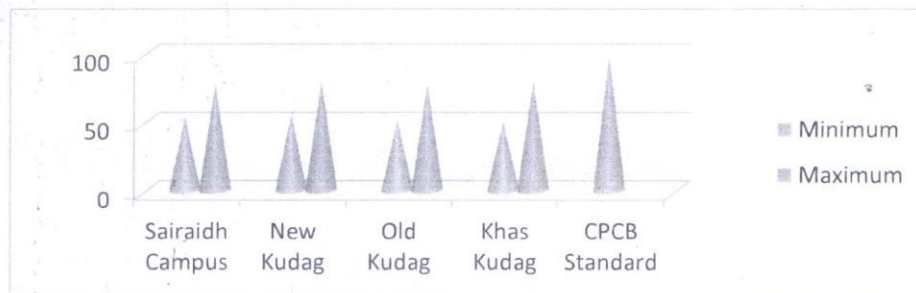


Respirable Suspended Particulate Matter –RSPM

The minimum and maximum concentrations for RSPM were recorded as $63\mu\text{g}/\text{m}^3$ and $86\mu\text{g}/\text{m}^3$ respectively. The average values were observed to be in the range of 67 to $81\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 71 to $86\mu\text{g}/\text{m}^3$ in the study area (**Table 7**).

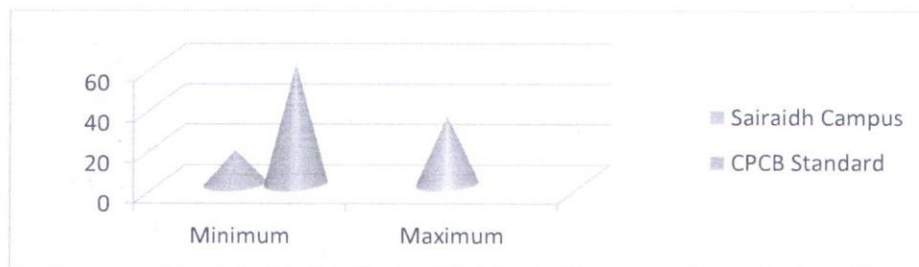
Graphical Presentation of Fugitive Emission Monitoring

RSPM



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

The minimum and maximum values of $\text{PM}_{2.5}$ concentrations varied between 16 to $32\mu\text{g}/\text{m}^3$ respectively. The average values range between 19 to $30\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 21 to $32\mu\text{g}/\text{m}^3$ (**Table 8**).

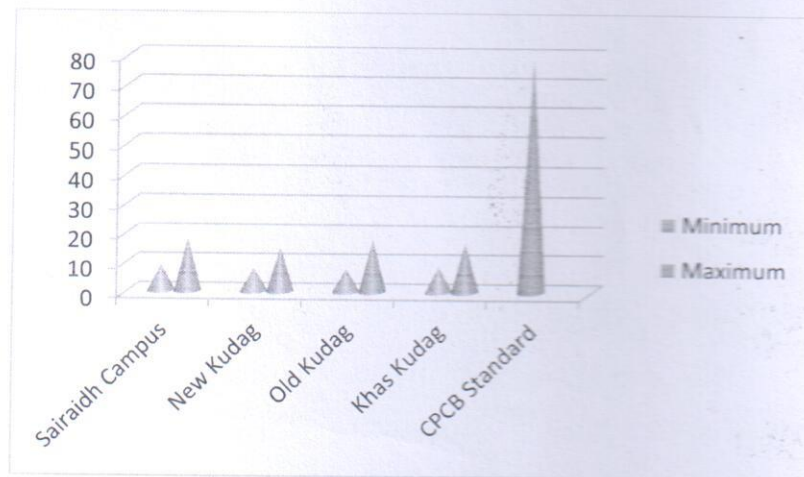


Sulphur Dioxide (SO₂)

The minimum and maximum SO₂ concentrations were recorded as 7µg/m³ and 18µg/m³ respectively. The average values were observed to be in the range of 8 to 15µg/m³ and 98th percentile values varied between 9 to 18µg/m³ (Table 9).

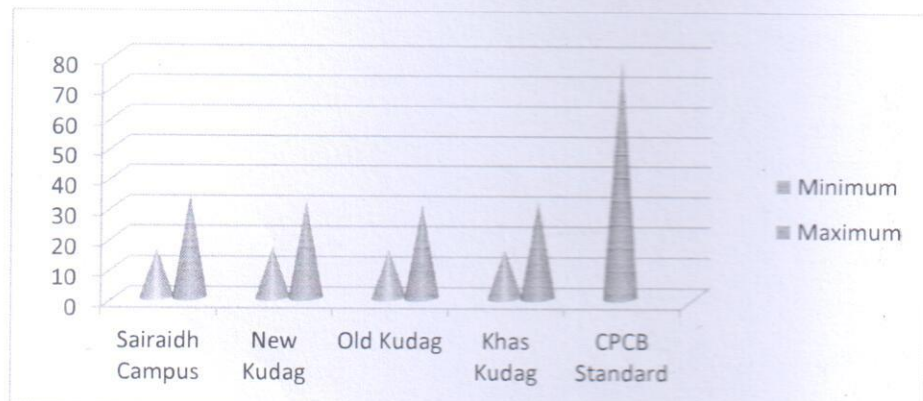
Graphical Presentation Of Fugitive Emission Monitoring

SO₂



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 12µg/m³ and 34µg/m³. The average concentrations were ranged between 15 to 30µg/m³ and 98th percentile values varied between 21 to 34µg/m³ (Table 10).





Lead (Pb)

The minimum and maximum Lead detected between 0.016 to 0.037 $\mu\text{g}/\text{m}^3$ respectively. The average Lead detected between 0.020 to 0.033 $\mu\text{g}/\text{m}^3$ & 98th percentile values varied between 0.024 to 0.037 $\mu\text{g}/\text{m}^3$ in the study region (Table 11).

Mercury (Hg)

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

Arsenic (As)

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

Chromium (Cr)

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

1.7 Ambient Air Quality (Buffer Zone)

The background levels of SPM, RSPM (PM_{10}), $\text{PM}_{2.5}$, SO_2 , NO_x , Pb, Hg, As, Cr and Dust fall are required to compute Buffer Zone. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, Maximum concentration, Arithmetic mean (AM), Geometric mean (GM), and 98 Percentile are presented in tabular form (Table 6).

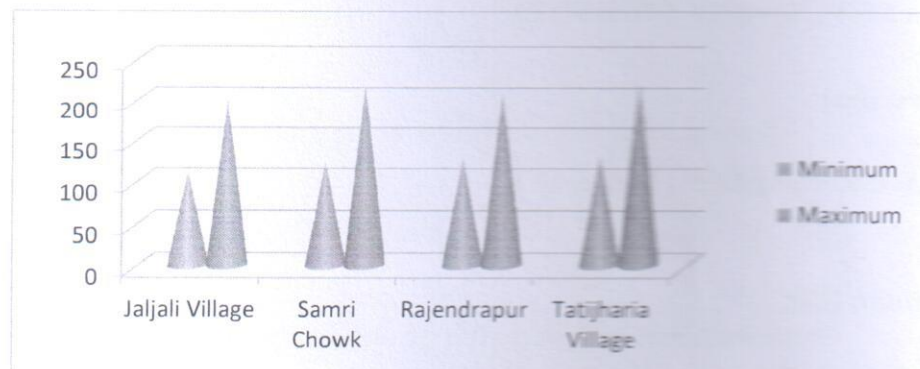
1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month of July-August-September-2018 are presented in detail in Table 6. 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 Buffer Zone area. The minimum and maximum values varied between 129 to 227 $\mu\text{g}/\text{m}^3$ respectively during study period at all the 4 locations. The average values ranged between 147 to 200 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 163 to 226 $\mu\text{g}/\text{m}^3$ in the study area.

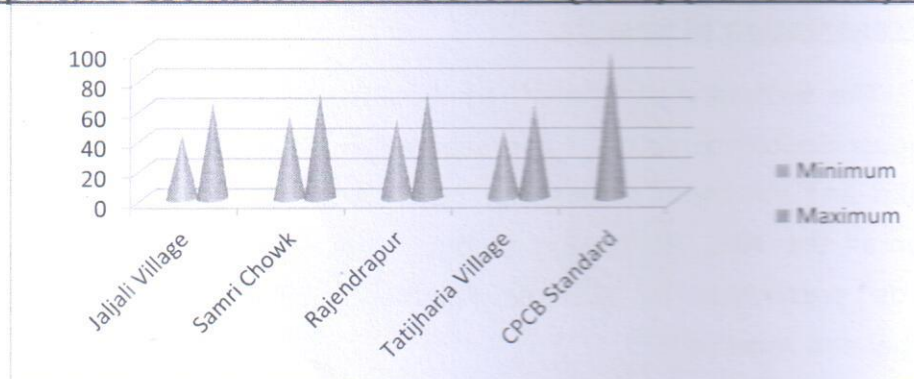
Graphical Presentation of Ambient Air Quality (Buffer Zone)



Particulate Matter-RSPM

The minimum and maximum values of RSPM varied between 56 to 82 $\mu\text{g}/\text{m}^3$ respectively (**Table 7**). The average values varied between 59 to 77 $\mu\text{g}/\text{m}^3$. The 98th percentile values varied between 61 to 82 $\mu\text{g}/\text{m}^3$ in the mining area. The overall values of SPM and RSPM were well within the CPCB limits prescribe for industrial and residential area in the study area during the study period.

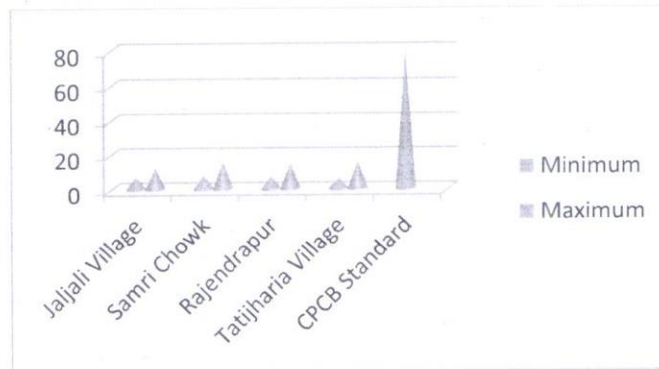
Graphical Presentation Of Ambient Air Quality (Buffer Zone) RSPM





Sulphur Dioxide (SO₂)

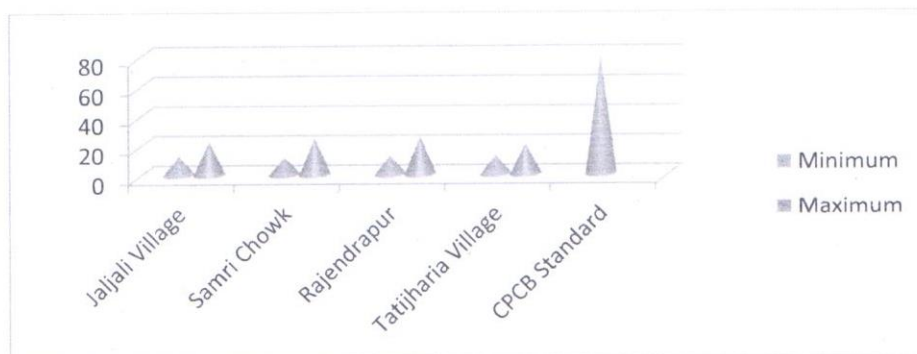
The minimum and maximum values of SO₂ concentrations varied between 6 to 18µg/m³ respectively. The average values range between 8 to 16µg/m³ and 98th percentile values varied between 9 to 18µg/m³ (**Table 9**).



Nitrogen Oxide (NO_x)

The minimum and maximum values of NO_x concentrations varied between 9 to 31µg/m³ respectively. The average values range between 12 to 25µg/m³ and 98th percentile values varied between 14 to 31µg/m³ (**Table 10**).

Graphical Presentation Of Ambient Air Quality (Buffer Zone) NO_x





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 July-August-September-2018 in Old Kudag/Mining Area and Khas Kudag village. The dust fall rate was observed to be 21.4 and 24.0MT/km²/month respectively as given in (**Table 14**).

Overall the ambient air concentrations of SPM, RSPM, SO₂, NO_x, Pb, As, Cr and Hg were well within the limits of concentrations promulgated by CPCB, New Delhi in the study area.



1.8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (July-August-September-2018) indicates that the wind was blowing predominantly from (WSW and W) directions, during study period, for 0.27 % wind was found to be calm. The graphical illustration and wind rose diagram is presented in Figures-1 & 2 respectively.

Table.1
Wind Frequency Distribution Data

Sr.No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
1	348.75 - 11.25	0.001376	0.002751	0.001376	0.000000	0.000000	0.000000	0.005502
2	11.25 - 33.75	0.002751	0.012380	0.002751	0.002751	0.000000	0.000000	0.020633
3	33.75 - 56.25	0.004127	0.001376	0.000000	0.000000	0.000000	0.000000	0.005502
4	56.25 - 78.75	0.004127	0.002751	0.000000	0.000000	0.000000	0.000000	0.006878
5	78.75 - 101.25	0.001376	0.002751	0.001376	0.000000	0.000000	0.000000	0.005502
6	101.25 - 123.75	0.004127	0.000000	0.001376	0.000000	0.000000	0.000000	0.005502
7	123.75 - 146.25	0.006878	0.000000	0.008253	0.001376	0.000000	0.000000	0.016506
8	146.25 - 168.75	0.002751	0.006878	0.009629	0.000000	0.000000	0.000000	0.019257
9	168.75 - 191.25	0.005502	0.002751	0.004127	0.000000	0.000000	0.000000	0.012380
10	191.25 - 213.75	0.008253	0.002751	0.004127	0.000000	0.000000	0.000000	0.015131
11	213.75 - 236.25	0.017882	0.008253	0.049519	0.011004	0.000000	0.000000	0.086657
12	236.25 - 258.75	0.012380	0.039890	0.221458	0.116919	0.000000	0.000000	0.390646
13	258.75 - 281.25	0.013755	0.031637	0.163686	0.097662	0.000000	0.000000	0.306740
14	281.25 - 303.75	0.006878	0.030261	0.035763	0.004127	0.000000	0.000000	0.077029
15	303.75 - 326.25	0.004127	0.008253	0.006878	0.000000	0.000000	0.000000	0.019257
16	326.25 - 348.75	0.000000	0.004127	0.000000	0.000000	0.000000	0.000000	0.004127
	Sub-Total	0.096286	0.156809	0.510316	0.233838	0.000000	0.000000	0.995879
	Calms							0.002747
	Missing/Incomplete							0.001374
	Total							1.000000

SUMMARY OF WIND PATTERN

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
July-Aug-Sept 2018	WSW (39.06%)	W (30.67%)	0.27 %

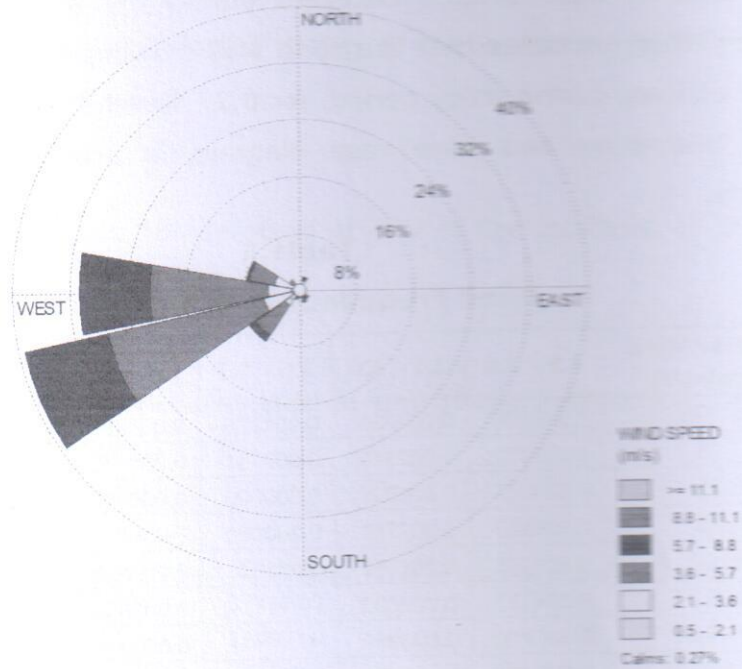


Figure.01: Wind Class Frequency Distribution (July-Aug-Sept-2018).

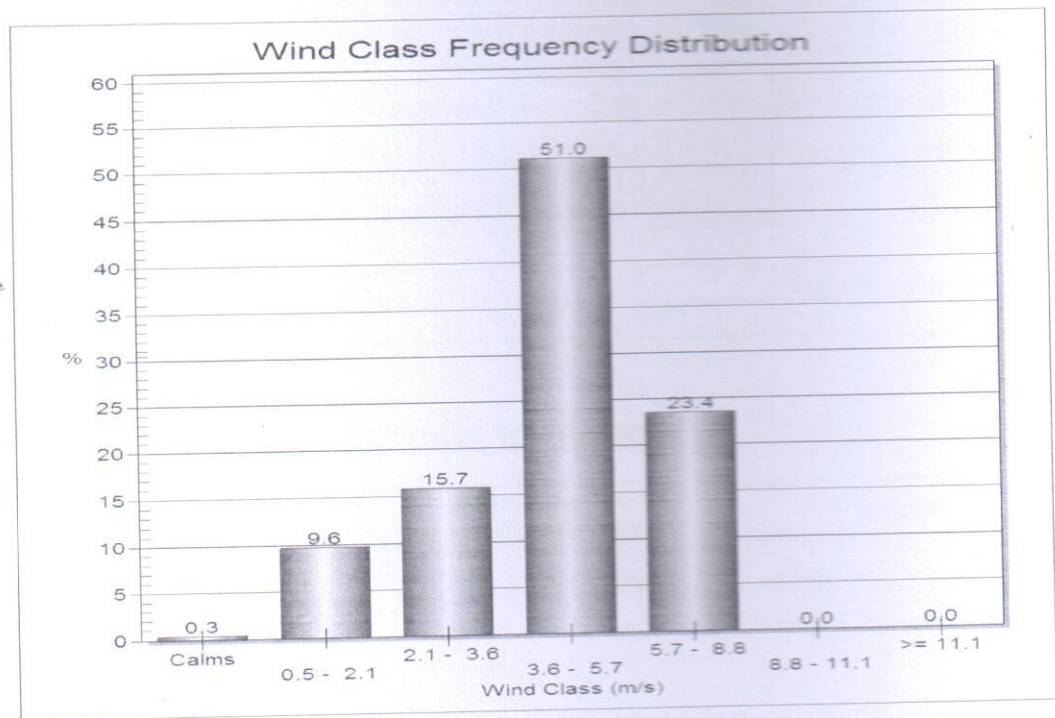


Figure.02: Wind Rose Diagram (July-Aug-Sept-2018)



1.5 Noise Environment

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

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

Identification of sampling locations

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

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

Instrument used for monitoring

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

Method of Monitoring

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

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



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

2.0 Water Quality Monitoring

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

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

The physico-chemical analysis of water samples collected during the study period is given in (Table16 and Fig.5). The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water & found to be fit for drinking purpose for tested parameters. Thus the impacts due to mining activities have been found to be insignificant.

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

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

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



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):-						
Sairaidh Campus	July-2018	193	247	220	220	246
	August-2018	233	259	246	246	258
	September-2018	222	252	237	237	251
New Kudag/Nr. Weigh Bridge	July-2018	187	237	212	212	236
	August-2018	226	303	265	265	301
	September-2018	194	294	244	244	292
Old Kudag/Mining Area	July-2018	237	287	262	262	286
	August-2018	266	311	289	289	310
	September-2018	235	264	250	250	263
Khas Kudag	July-2018	224	258	241	241	257
	August-2018	237	261	249	249	261
	September-2018	153	184	169	169	183
CPCB Standard				---		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Buffer Zone :-						
Daljali Village	July-2018	129	164	147	147	163
	August-2018	152	204	178	178	203
	September-2018	134	182	158	158	181
Samri Chowk/ Nr.Old Weigh Bridge	July-2018	143	186	165	165	185
	August-2018	175	217	196	196	216
	September-2018	146	192	169	169	191
Rajendrapur	July-2018	144	181	163	163	180
	August-2018	157	215	186	186	214
	September-2018	151	187	169	169	186
Tatijharia Village	July-2018	159	181	170	170	181
	August-2018	172	227	200	200	226
	September-2018	153	206	180	180	205
CPCB Standard				---		

Conclusion-A:-

- 1) **Sairaidh Campus Lease Area Core Zone** :- For the Months of July-Aug-Sept-2018 Avg. of SPM is $234 \mu\text{g}/\text{m}^3$.
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone**:- For the Months of July-Aug-Sept -2018 Avg. of SPM is $240 \mu\text{g}/\text{m}^3$.
- 3) **Old Kudag/Mining Lease Area Core Zone** :- For the Months of July-Aug-Sept-2018 Avg. of SPM is $267 \mu\text{g}/\text{m}^3$.
- 4) **Khas Kudag Lease Area Core Zone** :- For the Months of July-Aug-Sept-2018 Avg. of SPM is $220 \mu\text{g}/\text{m}^3$.

- The Average Concentration of SPM within the core zone of Kudag Lease is $240 \mu\text{g}/\text{m}^3$.

Conclusion-B:-

- 1) **Daljali Village Lease Area Buffer Zone** :- For the Months of July-Aug-Sept -2018 Avg. of SPM is $161 \mu\text{g}/\text{m}^3$.
- 2) **Samri Chowk Lease Area Buffer Zone** :- For the Months of July-Aug-Sept -2018 Avg. of SPM is $177 \mu\text{g}/\text{m}^3$.
- 3) **Rajendrapur Lease Area Buffer Zone** :- For the Months of July-Aug-Sept -2018 Avg. of SPM is $173 \mu\text{g}/\text{m}^3$.
- 4) **Tatijharia Lease Area Buffer Zone** :- For the Months of July-Aug-Sept -2018 Avg. of SPM is $183 \mu\text{g}/\text{m}^3$.

- The Average Concentration of SPM within the Buffer Zone of Kudag Lease is $173 \mu\text{g}/\text{m}^3$

Month wise Summary of Statistical Analysis of SPM

2.1 Fugitive Emission (Core Zone):-

2.1.1 Presentation of Results.

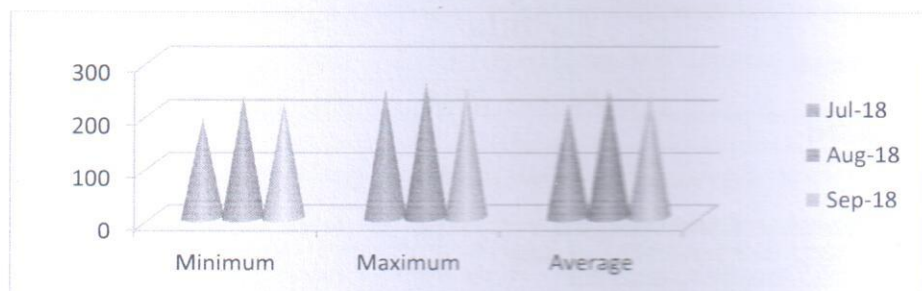
The summary of Statistical Analysis of SPM results for the month of July-2018 to September-2018 are presented in detail in Table 6. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $193\mu\text{g}/\text{m}^3$ and $247\mu\text{g}/\text{m}^3$ respectively and average concentration of $220\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $233\mu\text{g}/\text{m}^3$ and $259\mu\text{g}/\text{m}^3$ respectively and average concentration of $246\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $222\mu\text{g}/\text{m}^3$ and $252\mu\text{g}/\text{m}^3$ respectively and average concentration of $237\mu\text{g}/\text{m}^3$.



Graph :- Sairaidh Campus

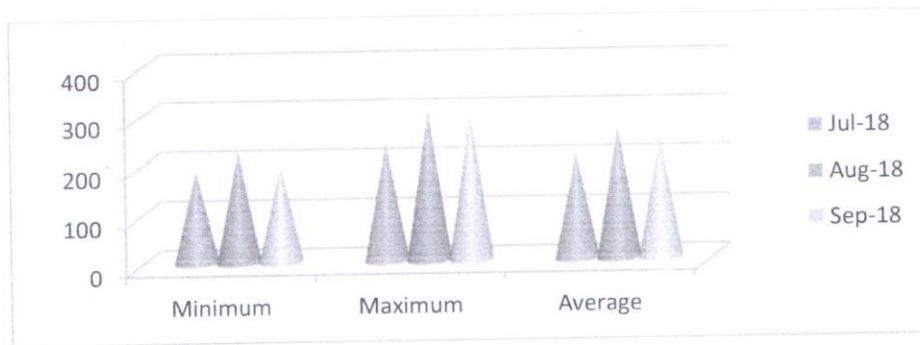


New Kudag/Nr.Weigh Bridge

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $187\mu\text{g}/\text{m}^3$ and $237\mu\text{g}/\text{m}^3$ respectively and average concentration of $212\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $226\mu\text{g}/\text{m}^3$ and $303\mu\text{g}/\text{m}^3$ respectively and average concentration of $265\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $194\mu\text{g}/\text{m}^3$ and $294\mu\text{g}/\text{m}^3$ respectively and average concentration of $244\mu\text{g}/\text{m}^3$.



Graph: - New Kudag/Nr.Weigh Bridge

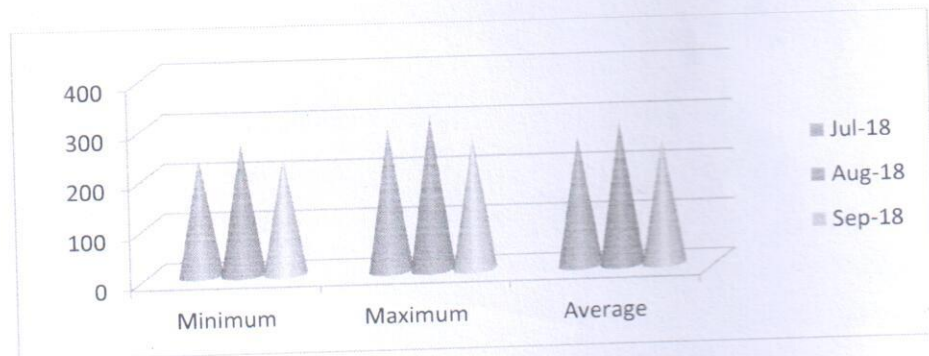


Old Kudag/Mining Area

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $237\mu\text{g}/\text{m}^3$ and $287\mu\text{g}/\text{m}^3$ respectively and average concentration of $262\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $266\mu\text{g}/\text{m}^3$ and $311\mu\text{g}/\text{m}^3$ respectively and average concentration of $289\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $235\mu\text{g}/\text{m}^3$ and $264\mu\text{g}/\text{m}^3$ respectively and average concentration of $250\mu\text{g}/\text{m}^3$.



Graph: - Old Kudag/Mining Area

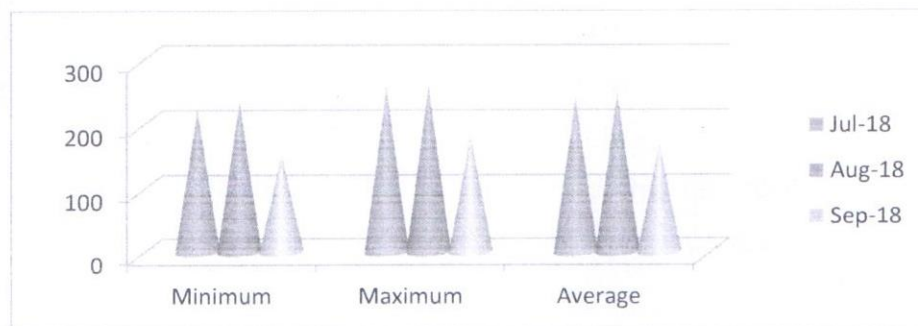


Khas Kudag

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $224\mu\text{g}/\text{m}^3$ and $258\mu\text{g}/\text{m}^3$ respectively and average concentration of $241\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $237\mu\text{g}/\text{m}^3$ and $261\mu\text{g}/\text{m}^3$ respectively and average concentration of $249\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $153\mu\text{g}/\text{m}^3$ and $184\mu\text{g}/\text{m}^3$ respectively and average concentration of $169\mu\text{g}/\text{m}^3$.



Graph: - Khas Kudag



2.2 Fugitive Emission (Buffer Zone):-

2.2.1 Presentation of Results.

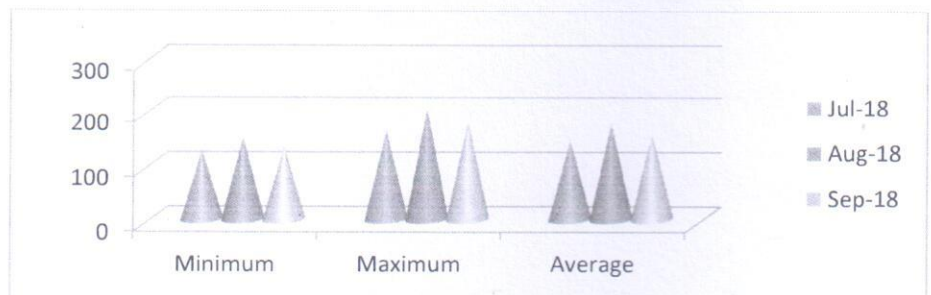
The summary of Statistical Analysis of SPM results for the month of July-2018 to September-2018 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $129\mu\text{g}/\text{m}^3$ and $164\mu\text{g}/\text{m}^3$ respectively and average concentration of $147\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $152\mu\text{g}/\text{m}^3$ and $204\mu\text{g}/\text{m}^3$ respectively and average concentration of $178\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $134\mu\text{g}/\text{m}^3$ and $182\mu\text{g}/\text{m}^3$ respectively and average concentration of $158\mu\text{g}/\text{m}^3$.



Graph: - Jaljali Village

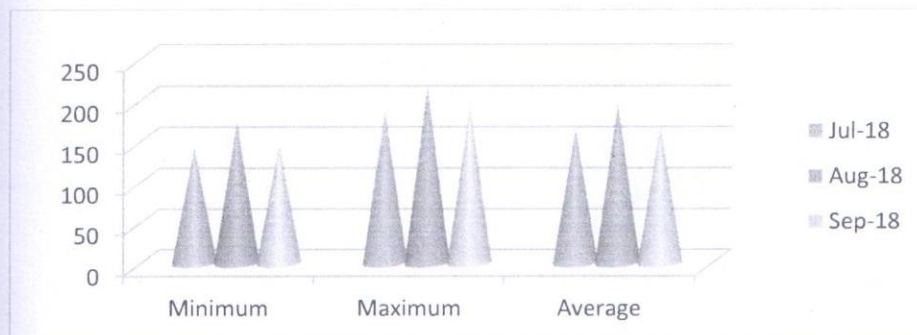


Samri Chowk/Nr.Old Weigh Bridge

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $143\mu\text{g}/\text{m}^3$ and $186\mu\text{g}/\text{m}^3$ respectively and average concentration of $165\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $175\mu\text{g}/\text{m}^3$ and $217\mu\text{g}/\text{m}^3$ respectively and average concentration of $196\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $146\mu\text{g}/\text{m}^3$ and $192\mu\text{g}/\text{m}^3$ respectively and average concentration of $169\mu\text{g}/\text{m}^3$.



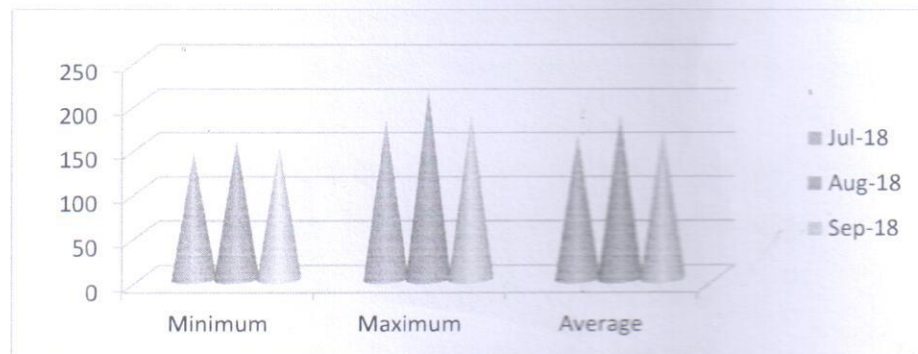
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $144\mu\text{g}/\text{m}^3$ and $181\mu\text{g}/\text{m}^3$ respectively and average concentration of $163\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $157\mu\text{g}/\text{m}^3$ and $215\mu\text{g}/\text{m}^3$ respectively and average concentration of $186\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $151\mu\text{g}/\text{m}^3$ and $187\mu\text{g}/\text{m}^3$ respectively and average concentration of $169\mu\text{g}/\text{m}^3$.



Graph:- Rajendrapur

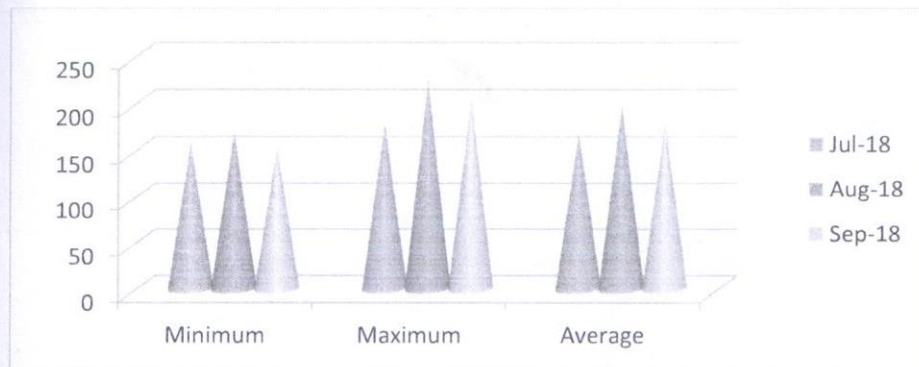


Tatijharia Village

For the month of July-2018 the minimum and maximum concentrations for SPM were recorded as $159\mu\text{g}/\text{m}^3$ and $181\mu\text{g}/\text{m}^3$ respectively and average concentration of $170\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for SPM were recorded as $172\mu\text{g}/\text{m}^3$ and $227\mu\text{g}/\text{m}^3$ respectively and average concentration of $200\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for SPM were recorded as $153\mu\text{g}/\text{m}^3$ and $206\mu\text{g}/\text{m}^3$ respectively and average concentration of $180\mu\text{g}/\text{m}^3$.



Graph: - Tatijharia Village

Table 7

Statistical Analysis of RSPM

Location	Month & Year	Min.	Max.	A.M.	G.M.	Unit: $\mu\text{g}/\text{m}^3$
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2018	68	76	72	72	
	August-2018	75	82	79	79	
	September-2018	69	79	74	74	
New Kudag/Nr. Weigh Bridge	July-2018	73	81	77	77	
	August-2018	76	86	81	81	
	September-2018	71	74	73	73	
Old Kudag/Mining Area	July-2018	67	75	71	71	
	August-2018	72	82	77	77	
	September-2018	67	79	73	73	
Khas Kudag	July-2018	63	71	67	67	
	August-2018	70	80	75	75	
	September-2018	66	78	72	72	
CPCB Standard		100 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Location	Month & Year	Min.	Max.	A.M.	G.M.	Unit: $\mu\text{g}/\text{m}^3$
Buffer Zone :-						
Jaljali Village	July-2018	56	62	59	59	
	August-2018	63	68	66	66	
	September-2018	58	61	60	60	
Samri Chowk/ Nr.Old Weigh Bridge	July-2018	65	72	69	69	
	August-2018	71	79	75	75	
	September-2018	71	82	77	77	
Rajendrapur	July-2018	64	70	67	67	
	August-2018	72	80	76	76	
	September-2018	68	77	73	73	
Tatijharia Village	July-2018	59	65	62	62	
	August-2018	63	69	66	66	
	September-2018	67	72	70	70	
CPCB Standard		100 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Conclusion-A:-

- Sairaidh Campus Lease Area Core Zone :-** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $75\mu\text{g}/\text{m}^3$.
 - New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $77\mu\text{g}/\text{m}^3$.
 - Old Kudag/Mining Lease Area Core Zone: -** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $74\mu\text{g}/\text{m}^3$.
 - Khas Kudag Lease Area Core Zone: -** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $71\mu\text{g}/\text{m}^3$.
- The Average Concentration of RSPM within the core zone of Kudag Lease is $74\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion-B:-

- Jaljali Village Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $62\mu\text{g}/\text{m}^3$.
 - Samri Chowk Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $74\mu\text{g}/\text{m}^3$.
 - Rajendrapur Lease Area Buffer Zone: -** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $72\mu\text{g}/\text{m}^3$.
 - Tatijharia Village Lease Area Buffer Zone: -** For the Months of July-Aug-Sept-2018 Avg. of RSPM is $66\mu\text{g}/\text{m}^3$.
- The Average Concentration of RSPM within the Buffer Zone of Kudag Lease is $68\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.



Month wise Summary of Statistical Analysis of RSPM

2.3 Fugitive Emission (Core Zone):-

2.3.1 Presentation of Results.

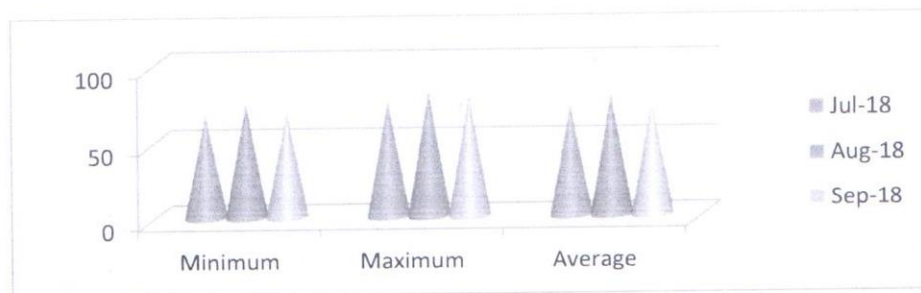
The summary of Statistical Analysis of RSPM results for the month of July-2018 to September-2018 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as 68 $\mu\text{g}/\text{m}^3$ and 76 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 72 $\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as 75 $\mu\text{g}/\text{m}^3$ and 82 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 79 $\mu\text{g}/\text{m}^3$.

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



Graph :- Sairaidh Campus



New Kudag/Nr.Weigh Bridge

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as $73\mu\text{g}/\text{m}^3$ and $81\mu\text{g}/\text{m}^3$ respectively and average concentration of $77\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as $76\mu\text{g}/\text{m}^3$ and $86\mu\text{g}/\text{m}^3$ respectively and average concentration of $81\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as $71\mu\text{g}/\text{m}^3$ and $74\mu\text{g}/\text{m}^3$ respectively and average concentration of $73\mu\text{g}/\text{m}^3$.



Graph: - New Kudag/Nr.Weigh Bridge

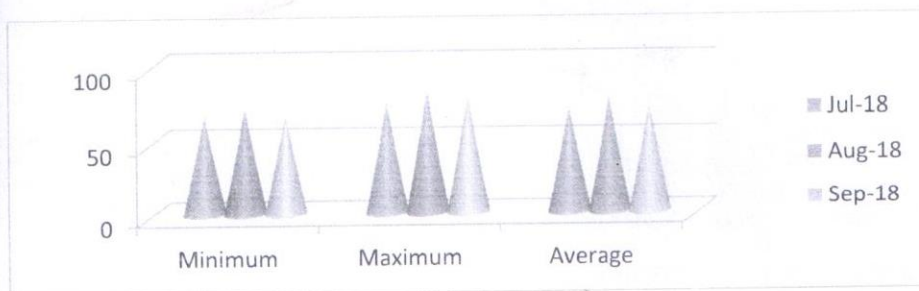


Old Kudag/Mining Area

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as $67\mu\text{g}/\text{m}^3$ and $75\mu\text{g}/\text{m}^3$ respectively and average concentration of $71\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as $72\mu\text{g}/\text{m}^3$ and $82\mu\text{g}/\text{m}^3$ respectively and average concentration of $77\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as $67\mu\text{g}/\text{m}^3$ and $79\mu\text{g}/\text{m}^3$ respectively and average concentration of $73\mu\text{g}/\text{m}^3$.



Graph: - Old Kudag/Mining Area



Khas Kudag

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as $63\mu\text{g}/\text{m}^3$ and $71\mu\text{g}/\text{m}^3$ respectively and average concentration of $67\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as $70\mu\text{g}/\text{m}^3$ and $80\mu\text{g}/\text{m}^3$ respectively and average concentration of $75\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as $66\mu\text{g}/\text{m}^3$ and $78\mu\text{g}/\text{m}^3$ respectively and average concentration of $72\mu\text{g}/\text{m}^3$.



Graph: - Khas Kudag



2.4 Fugitive Emission (Buffer Zone):-

2.4.1 Presentation of Results.

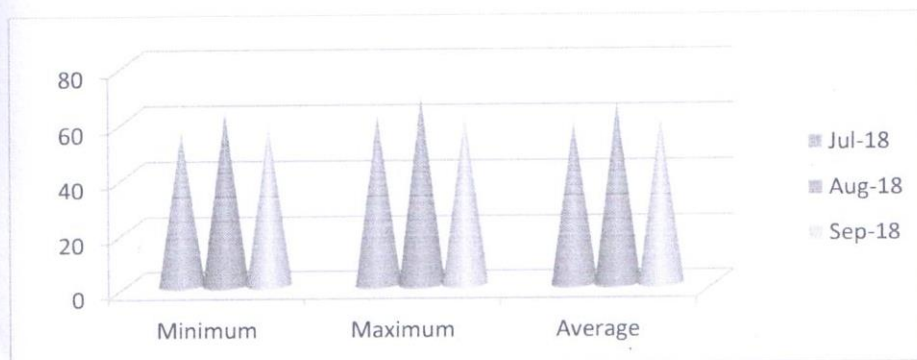
The summary of Statistical Analysis of RSPM results for the month of July-2018 to September-2018 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

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

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as $63\mu\text{g}/\text{m}^3$ and $68\mu\text{g}/\text{m}^3$ respectively and average concentration of $66\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as $58\mu\text{g}/\text{m}^3$ and $61\mu\text{g}/\text{m}^3$ respectively and average concentration of $60\mu\text{g}/\text{m}^3$.



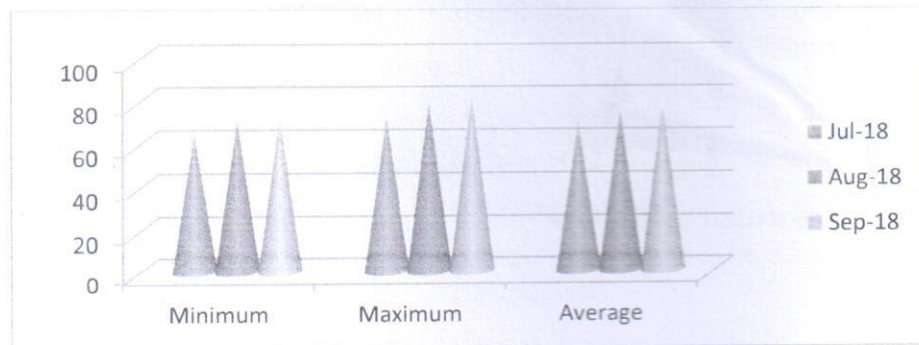
Graph: - Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

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

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as $71\mu\text{g}/\text{m}^3$ and $79\mu\text{g}/\text{m}^3$ respectively and average concentration of $75\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as $71\mu\text{g}/\text{m}^3$ and $82\mu\text{g}/\text{m}^3$ respectively and average concentration of $77\mu\text{g}/\text{m}^3$.



Graph: - Samri Chowk/Nr.Old Weigh Bridge

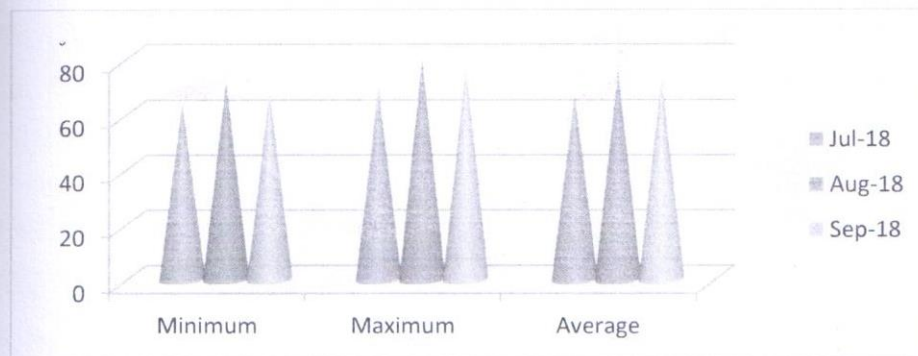


Rajendrapur

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as $64\mu\text{g}/\text{m}^3$ and $70\mu\text{g}/\text{m}^3$ respectively and average concentration of $67\mu\text{g}/\text{m}^3$.

For the month of August-2018 the minimum and maximum concentrations for RSPM were recorded as $72\mu\text{g}/\text{m}^3$ and $80\mu\text{g}/\text{m}^3$ respectively and average concentration of $75\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for RSPM were recorded as $68\mu\text{g}/\text{m}^3$ and $77\mu\text{g}/\text{m}^3$ respectively and average concentration of $73\mu\text{g}/\text{m}^3$.



Graph:- Rajendrapur

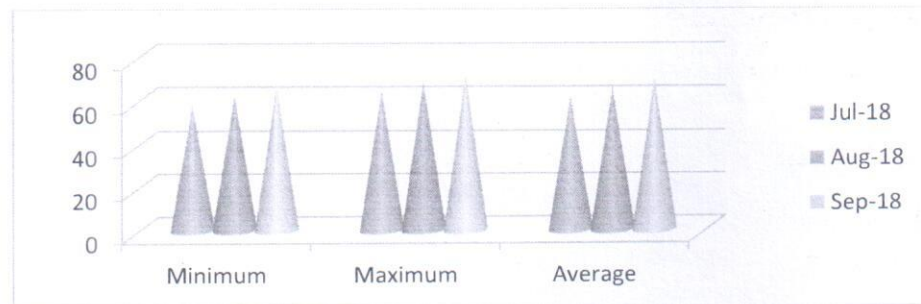


Tatijharia Village

For the month of July-2018 the minimum and maximum concentrations for RSPM were recorded as $59\mu\text{g}/\text{m}^3$ and $65\mu\text{g}/\text{m}^3$ respectively and average concentration of $62\mu\text{g}/\text{m}^3$.

For the month of August-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 September-2018 the minimum and maximum concentrations for RSPM were recorded as $67\mu\text{g}/\text{m}^3$ and $72\mu\text{g}/\text{m}^3$ respectively and average concentration of $70\mu\text{g}/\text{m}^3$.



Graph:- Tatijharia Village



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%
Sairaidh Campus	July-2018	16	21	19	19	21
	August-2018	28	32	30	30	32
	September-2018	24	28	26	26	28
CPCB Standard			60 $\mu\text{g}/\text{m}^3$ (24 hrs)			

Conclusion :-

The Average Concentration of PM_{2.5} within Kudag Lease during this period (July-August-September-2018) is 25 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of PM_{2.5}

Presentation of Results.

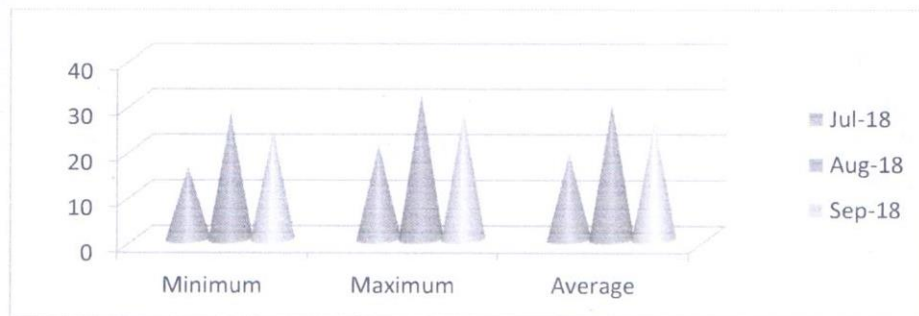
The summary of Statistical Analysis of PM_{2.5} results for the month of July-2018 to September-2018 are presented in detail in **Table 8**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for 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-2018 the minimum and maximum concentrations for PM_{2.5} were recorded as 28 $\mu\text{g}/\text{m}^3$ and 32 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 30 $\mu\text{g}/\text{m}^3$.

For the month of September-2018 the minimum and maximum concentrations for PM_{2.5} were recorded as 24 $\mu\text{g}/\text{m}^3$ and 28 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 26 $\mu\text{g}/\text{m}^3$.





Hindalco Industries Limited
Kudag Mining Environmental Status Report for
July-2018 To September-2018

Details of Salient Features

Table 9
Statistical analysis of SO₂

Unit: µg/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98 th
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2018	9	14	12	12	14
	August-2018	11	16	14	14	16
	September-2018	12	18	15	15	18
New Kudag/Nr. Weigh Bridge	July-2018	7	9	8	8	9
	August-2018	11	14	13	13	14
	September-2018	9	13	11	11	13
Old Kudag/Mining Area	July-2018	8	11	10	10	11
	August-2018	6	9	8	8	9
	September-2018	11	16	14	14	16
Khas Kudag	July-2018	9	13	11	11	13
	August-2018	11	14	13	13	14
	September-2018	7	9	8	8	9
CPCB Standard				80 µg/m³ (24 hrs)		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98 th
Buffer Zone :-						
Jaljali Village	July-2018	6	9	8	8	9
	August-2018	8	12	10	10	12
	September-2018	7	11	9	9	11
Samri Chowk/ Nr.Old Weigh Bridge	July-2018	11	16	14	14	16
	August-2018	13	18	16	16	18
	September-2018	9	14	12	12	14
Rajendrapur	July-2018	6	11	9	9	11
	August-2018	8	14	11	11	14
	September-2018	6	9	8	8	9
Tatijharia Village	July-2018	7	9	8	8	9
	August-2018	9	13	11	11	13
	September-2018	7	11	9	9	11
CPCB Standard				80 µg/m³ (24 hrs)		

Conclusion-A:-

- Sairaidh Campus Lease Area Core Zone :-** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 14µg/m³.
- New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 11µg/m³.
- Old Kudag/Mining Lease Area Core Zone: -** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 11µg/m³.
- Khas Kudag Lease Area Core Zone: -** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 11µg/m³.

• The Average Concentration of SO₂ within the core zone of Kudag Lease is 11µg/m³ and it is within permissible limits as per CPCB Standard.

Conclusion-B:-

- Jaljali Village Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 9 µg/m³.
 - Samri Chowk Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 14µg/m³.
 - Rajendrapur Lease Area Buffer Zone: -** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 9µg/m³.
 - Tatijharia Village Lease Area Buffer Zone: -** For the Months of July-Aug-Sept-2018 Avg. of SO₂ is 9µg/m³.
- The Average Concentration of SO₂ within the Buffer Zone of Kudag Lease is 10µg/m³ and it is within permissible limits as per CPCB Standard.



2.6 Fugitive Emission (Core Zone):-

2.6.1 Presentation of Results.

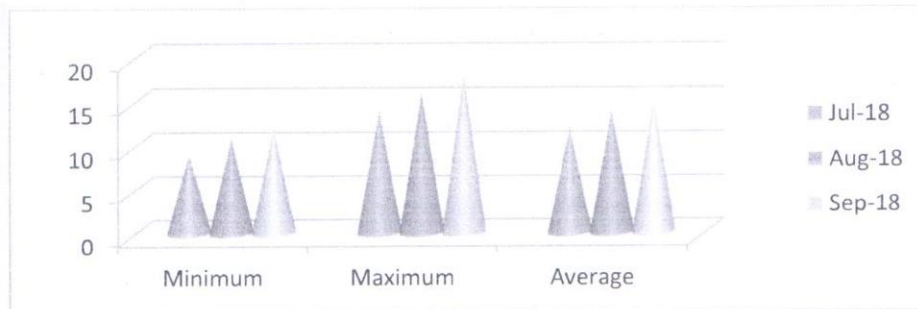
The summary of Statistical Analysis of SO₂ results for the month of July-2018 to September-2018 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

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

For the month of August-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 September-2018 the minimum and maximum concentrations for SO₂ were recorded as 12µg/m³ and 18µg/m³ respectively and average concentration of 15µg/m³.



Graph :- Sairaidh Campus



New Kudag/Nr.Weigh Bridge

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

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



Graph: - New Kudag/Nr.Weigh Bridge

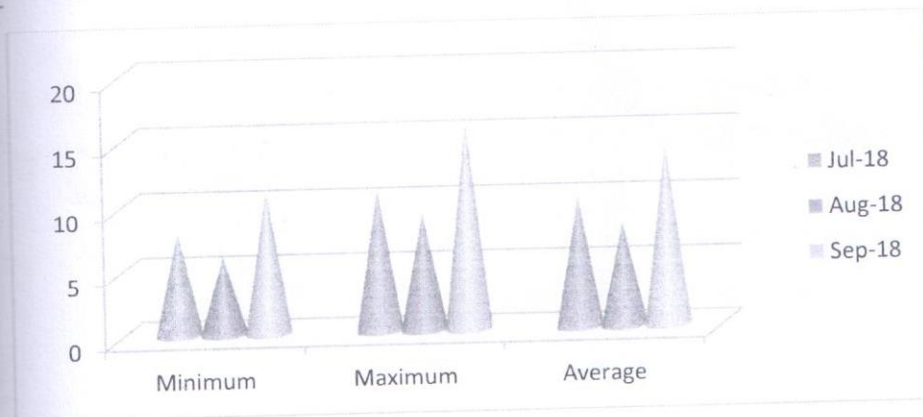


Old Kudag/Mining Area

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



Graph: - Old Kudag/Mining Area

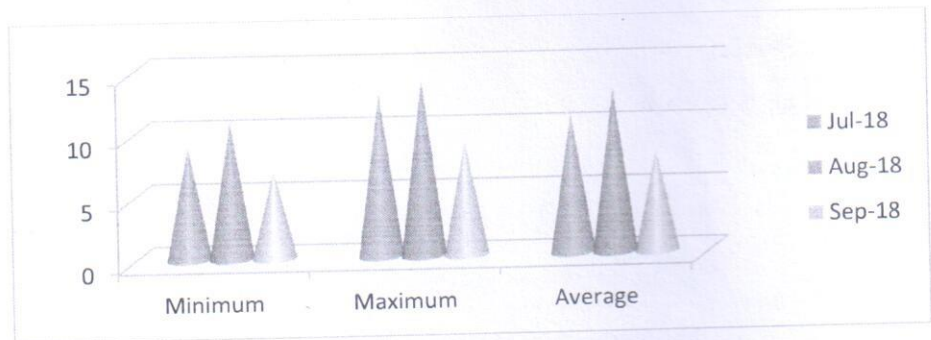


Khas Kudag

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

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



Graph: - Khas Kudag



2.7 Fugitive Emission (Buffer Zone):-

2.7.1 Presentation of Results.

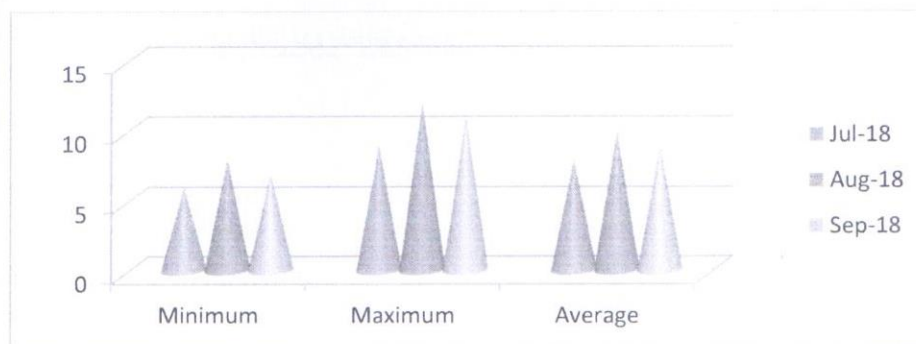
The summary of Statistical Analysis of SO₂ results for the month of July-2018 to September-2018 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

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



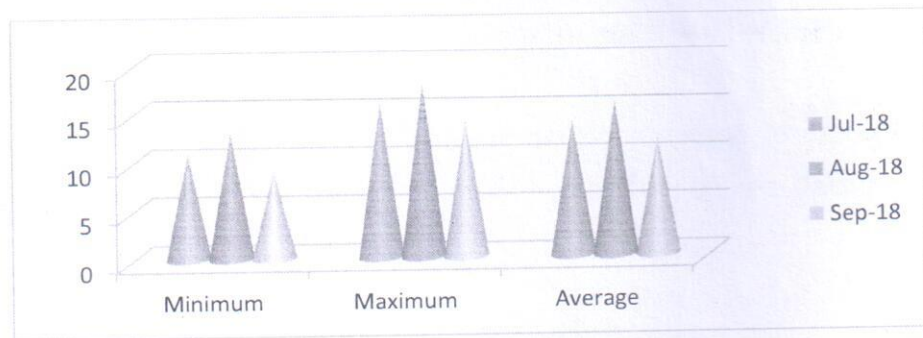
Graph: - Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of July-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 August-2018 the minimum and maximum concentrations for SO₂ were recorded as 13µg/m³ and 18µg/m³ respectively and average concentration of 16µg/m³.

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



Graph: - Samri Chowk/Nr.Old Weigh Bridge

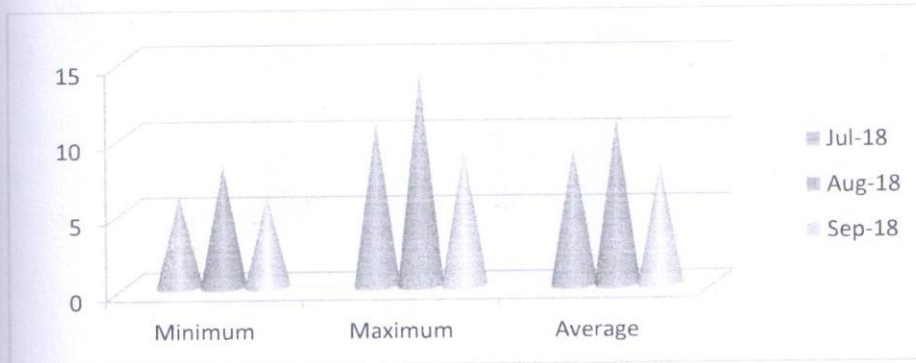


Rajendrapur

For the month of July-2018 the minimum and maximum concentrations for SO₂ were recorded as 6µg/m³ and 11µg/m³ respectively and average concentration of 9µg/m³.

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

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



Graph: - Rajendrapur

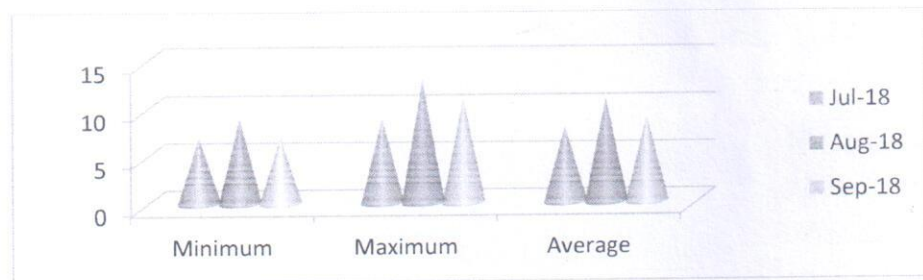


Tatijharia Village

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



Graph: - Tatijharia Village



Table 10
Statistical Analysis of NO_x

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sarnaidh Campus	July-2018	24	28	26	26	28
	August-2018	28	32	30	30	32
	September-2018	26	34	30	30	34
New Kudag/Nr. Weigh Bridge	July-2018	16	21	19	19	21
	August-2018	21	28	25	25	28
	September-2018	19	26	23	23	26
Old Kudag/Mining Area	July-2018	12	18	15	15	18
	August-2018	16	21	19	19	21
	September-2018	18	27	23*	23	27
Old Kudag	July-2018	16	23	20	20	23
	August-2018	19	27	23	23	27
	September-2018	21	32	27	27	32
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%
Buffer Zone :-						
Dajjali Village	July-2018	12	16	14	14	16
	August-2018	14	21	18	18	21
	September-2018	12	19	16	16	19
Samri Chowk/ Nr.Old Weigh Bridge	July-2018	16	24	20	20	24
	August-2018	18	31	25	25	31
	September-2018	16	21	19	19	21
Rajendrapur	July-2018	17	24	21	21	24
	August-2018	21	28	25	25	28
	September-2018	16	19	18	18	19
Tatijharia Village	July-2018	12	16	14	14	16
	August-2018	13	18	16	16	18
	September-2018	9	14	12	12	14
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Conclusion-A:-

- 1) **Sarnaidh Campus Lease Area Core Zone :-** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 29 $\mu\text{g}/\text{m}^3$.
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 22 $\mu\text{g}/\text{m}^3$.
- 3) **Old Kudag/Mining Lease Area Core Zone: -** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 19 $\mu\text{g}/\text{m}^3$.
- 4) **Old Kudag Lease Area Core Zone: -** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 23 $\mu\text{g}/\text{m}^3$.

→The Average Concentration of NO_x within the core zone of Kudag Lease is 23 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion-B:-

- 1) **Dajjali Village Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 16 $\mu\text{g}/\text{m}^3$.
- 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 21 $\mu\text{g}/\text{m}^3$.
- 3) **Rajendrapur Lease Area Buffer Zone: -** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 21 $\mu\text{g}/\text{m}^3$.
- 4) **Tatijharia Village Lease Area Buffer Zone: -** For the Months of July-Aug-Sept-2018 Avg. of NO_x is 14 $\mu\text{g}/\text{m}^3$.

→The Average Concentration of NO_x within the Buffer Zone of Kudag Lease is 18 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of NO_x

2.8 Fugitive Emission (Core Zone):-

2.8.1 Presentation of Results.

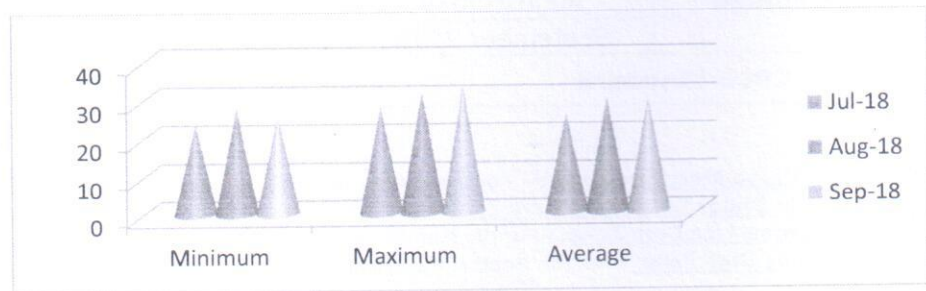
The summary of Statistical Analysis of NO_x results for the month of July-2018 to September-2018 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2018 the minimum and maximum concentrations for NO_x were recorded as 24 µg/m³ and 28 µg/m³ respectively and average concentration of 26 µg/m³.

For the month of August-2018 the minimum and maximum concentrations for NO_x were recorded as 28 µg/m³ and 32 µg/m³ respectively and average concentration of 30 µg/m³.

For the month of September-2018 the minimum and maximum concentrations for NO_x were recorded as 26 µg/m³ and 34 µg/m³ respectively and average concentration of 30µg/m³.



Graph :- Sairaidh Campus

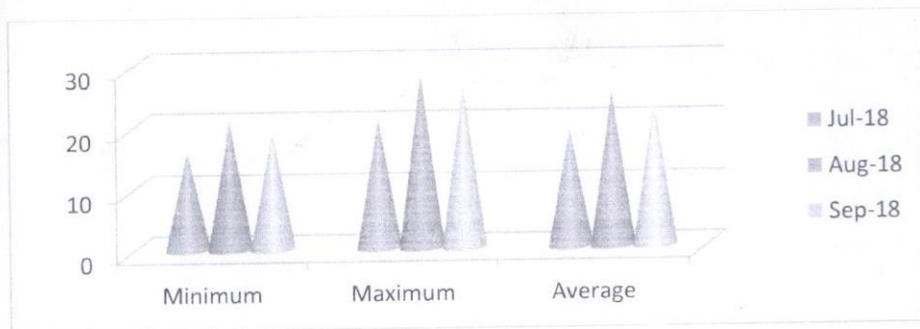


New Kudag/Nr.Weigh Bridge

For the month of July-2018 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.

For the month of August-2018 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.

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



Graph: - New Kudag/Nr.Weigh Bridge

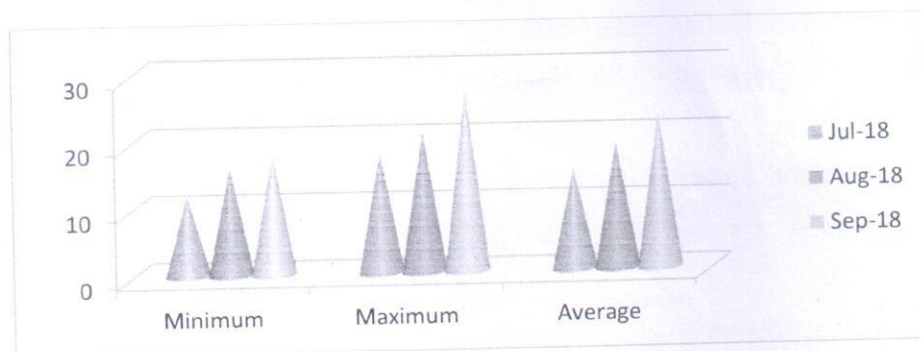


Old Kudag/Mining Area

For the month of July-2018 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-2018 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.

For the month of September-2018 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.



Graph: - Old Kudag/Mining Area

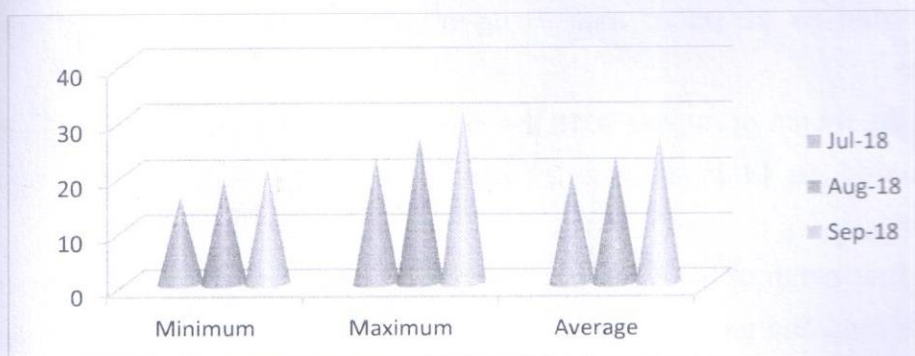


Khas Kudag

For the month of July-2018 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 August-2018 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 27 µg/m³ respectively and average concentration of 23 µg/m³.

For the month of September-2018 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 32 µg/m³ respectively and average concentration of 27 µg/m³.



Graph: - Khas Kudag

2.9 Fugitive Emission (Buffer Zone):-

2.9.1 Presentation of Results.

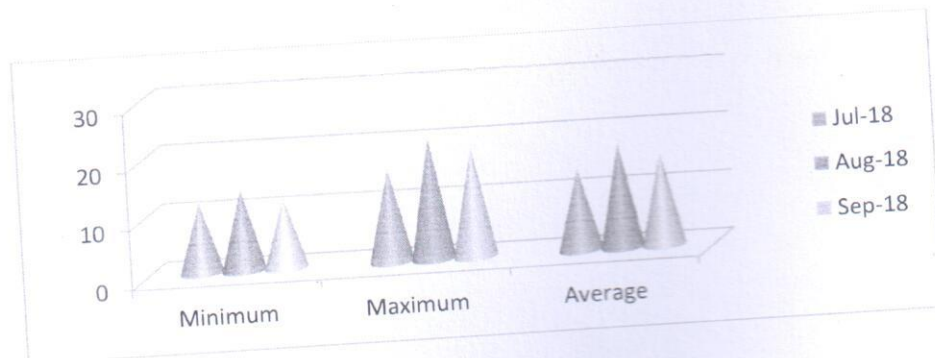
The summary of Statistical Analysis of NO_x results for the month of July-2018 to September-2018 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc. have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of July-2018 the minimum and maximum concentrations for NO_x were recorded as 12 µg/m³ and 16 µg/m³ respectively and average concentration of 14 µg/m³.

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



Graph: - Jaljali Village

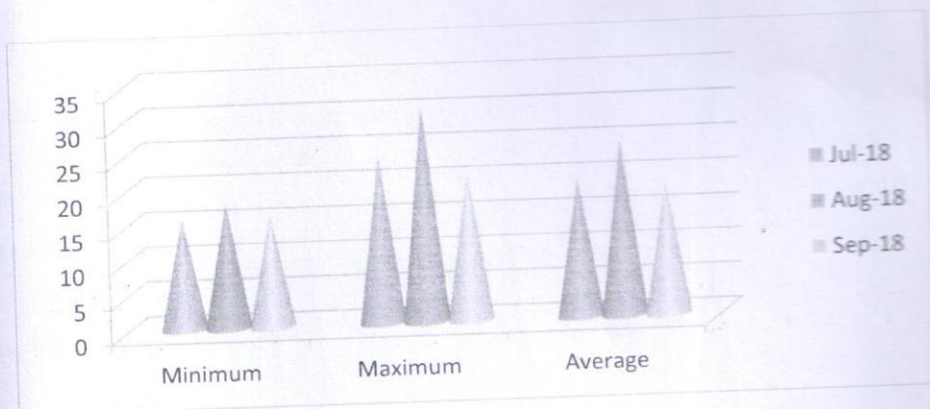


Samri Chowk/Nr.Old Weigh Bridge

For the month of July-2018 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-2018 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 31 µg/m³ respectively and average concentration of 25 µg/m³.

For the month of September-2018 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.



Graph: - Samri Chowk/Nr.Old Weigh Bridge

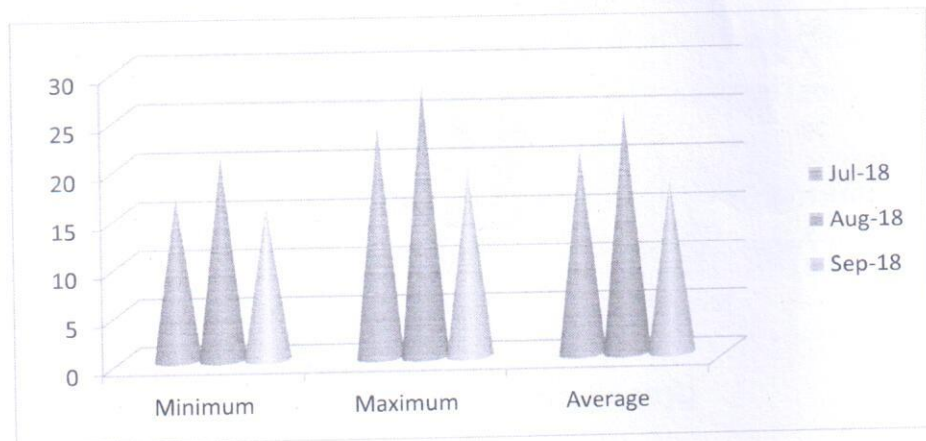


Rajendrapur

For the month of July-2018 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.

For the month of August-2018 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.

For the month of September-2018 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 19 µg/m³ respectively and average concentration of 18 µg/m³.



Graph: - Rajendrapur

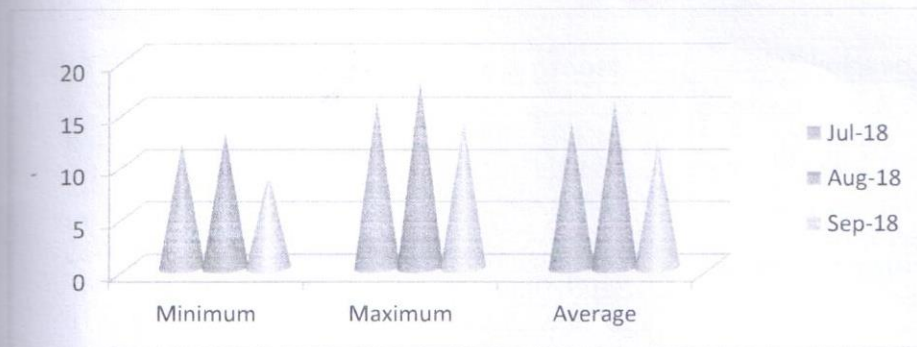


Tatijharia Village

For the month of July-2018 the minimum and maximum concentrations for NO_x were recorded as 12 µg/m³ and 16 µg/m³ respectively and average concentration of 14 µg/m³.

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



Graph: - Tatijharia Village


	Hindalco Industries Limited Kudag Mining Environmental Status Report for July-2018 To September-2018	Details of Salient Features
---	---	--

Table 11
Statistical Analysis of Pb

Unit: $\mu\text{g}/\text{m}^3$						
Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2018	0.024	0.031	0.028	0.028	0.031
	August-2018	0.028	0.037	0.033	0.033	0.037
	September-2018	0.016	0.024	0.020	0.020	0.024
New Kudag/Nr. Weigh Bridge	July-2018	0.021	0.032	0.027	0.027	0.032
	August-2018	0.019	0.028	0.024	0.024	0.028
	September-2018	0.024	0.026	0.025	0.025	0.026
Old Kudag/Mining Area	July-2018	0.018	0.024	0.021	0.021	0.024
	August-2018	0.021	0.032	0.027	0.027	0.032
	September-2018	0.019	0.026	0.023	0.023	0.026
Khas Kudag	July-2018	0.018	0.028	0.023	0.023	0.028
	August-2018	0.021	0.036	0.029	0.029	0.036
	September-2018	0.019	0.037	0.028	0.028	0.037
CPCB Standard				1.0 $\mu\text{g}/\text{m}^3$ (24 hrs)		

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

Conclusion: A)

The Average Concentration of Pb within the Core Zone of Kudag Lease during this period (July-August-September-2018) is $0.043\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion: B)

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



Table 12
Statistical Analysis of Hg

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

$\mu\text{g}/\text{m}^3$	Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
98%	Positive Emission (Core Zone):-						
	Sairaidh Campus	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	New Kudag/Nr. Weigh Bridge	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	Old Kudag/Mining Area	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	Khas Kudag	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	CPCB Standard	---					
	Buffer Zone :						
	Jaljala Village	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	Samri Chowk/ Nr. Old Weigh Bridge	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	Rajendrapur	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	Tatijharia Village	July-2018	ND	ND	ND	ND	ND
		August-2018	ND	ND	ND	ND	ND
		September-2018	ND	ND	ND	ND	ND
	CPCB Standard	---					

Conclusion: A

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

Conclusion: B

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


	Hindalco Industries Limited Kudag Mining Environmental Status Report for July-2018 To September-2018	Details of Salient Features
---	---	--

Table 13

Statistical Analysis of As

Unit: ng/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
New Kudag/Nr. Weigh Bridge	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
Old Kudag/Mining Area	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
Khas Kudag	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
CPCB Standard	06 ng/m³ (Annual)					
Buffer Zone :-						
Jaljali Village	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
Samri Chowk/ Nr.Old Weigh Bridge	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
Rajendrapur	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
Tatijharia Village	July-2018	ND	ND	ND	ND	ND
	August-2018	ND	ND	ND	ND	ND
	September-2018	ND	ND	ND	ND	ND
CPCB Standard	06 ng/m³ (Annual)					

Conclusion: A

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

Conclusion: B)

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



Hindalco Industries Limited
Kudag Mining Environmental Status Report for
July-2018 To September-2018

Details of Salient Features

Free Silica:-

Sr. No.	Location	Measurement Unit	July-2018		August-2018		September-2018	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Old Kudag/Mining Area	g/100gm	0.21	0.14	0.27	0.16	0.26	0.13

Table 14
Dust fall rate

S.No.	Location	July-2018	August-2018	September-2018	Average
Rate (mt/km²/month)					
1	Old Kudag/Mining Area	17.6	21.9	24.7	21.4
2	Khas kudag	19.2	24.7	28.1	24.0

Table 15
Noise Level Monitoring

Unit: dB(A) Leq

Sl. No.	Location	July-2018		August-2018		September-2018	
		Day	Night	Day	Night	Day	Night
Core Zone							
1	Sairaidh Campus	53.8	47.2	61.3	52.7	64.1	42.9
2	New Kudag/Near Weigh Bridge	64.1	53.8	57.1	49.9	61.4	51.6
3	Old Kudag/Mining Area	58.3	51.9	64.7	59.1	57.2	38.1
4	Khas Kudag	54.9	42.1	61.4	46.2	58.1	42.7
Buffer Zone							
1	Jaljali Village	52.1	37.9	51.8	42.7	46.3	37.1
2	Samri Chowk/Nr.Old Weigh Bridge	54.8	42.7	52.6	41.9	48.2	38.7
3	Rajendrapur	48.3	38.1	46.2	37.3	51.6	42.6
4	Tatijharia Village	51.9	42.8	48.3	39.1	46.1	38.2

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



Table 15-A

HEMM Spot Noise Level Monitoring

Unit: dB(A) Leq

Sr. No.	Location	July-2018			August-2018			September-2018		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	New Kudag/Nr. Weigh Bridge	67.1	71.9	69.5	68.2	76.3	72.3	71.6	82.4	77.1



3.0 Ground Water Quality: Most of the villages in the nearby plant area have Hand Pumps and wells, as most of the residents of these villages make use of this water for drinking and other domestic uses for TABLE NO.16

Table 16

Report on Chemical Examination of Ground Water

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

TEST RESULTS

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	7.04 at 25°C
2	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.8
3	Colour	Hazen units	IS 3025 (Part 4)	5	15	1
4	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.14
7	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	Min. 1	< 0.1
8	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000	416
9	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.31
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	42.76
12	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	104.92
13	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	180.69
14	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	53.81
15	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	11.24
16	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	27.43
17	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	12.59
18	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	< 0.05
20	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation	< 0.0005
21	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.001
22	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
23	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.01
24	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	< 0.005
25	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
26	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	< 0.1
27	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
28	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
29	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.1
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

Contd.....



(Contd.....)

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
33.	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
34.	Silver (as Ag)	mg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
35.	Polychlorinated Biphenyls (PCB)	µg/l	UDECA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform			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	< 0.01
41.	Polynuclear aromatic hydrocarbon (PAH)	µg/l	UDECA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	---	---	Absent
43.	<i>Escherichia coli</i>	Per100 ml	IS 1622	Absent	Absent	Absent
Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
44.	Pesticides residues					
i.	Alpha-HCH	µg/l	UDECA 508	0.01		< 0.01
ii.	Beta HCH	µg/l	UDECA 508	0.04		< 0.03
iii.	Delta- HCH	µg/l	UDECA 508	0.04		< 0.03
iv.	Alachlor	µg/l	UDECA 508	20		< 0.03
v.	Aldrin / Dieldrin	µg/l	UDECA 508	0.03		< 0.03
vi.	Atrazine	µg/l	UDECA 1657	2		< 0.03
vii.	Butachlor	µg/l	UDECA 508	125		< 0.03
viii.	Chlorpyrifos	µg/l	UDECA 1657	30		< 0.03
ix.	DDT and its Isomers	µg/l	UDECA 508	1		< 0.03
x.	Gamma - HCH (Lindane)	µg/l	UDECA 508	2		< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	UDECA 1657	30		< 0.03
xii.	Endosulphan	µg/l	UDECA 508	0.4		< 0.03
xiii.	Ethion	µg/l	UDECA 1657	3		< 0.03
xiv.	Isoproturon	µg/l	UDECA 1657	9		< 0.03
xv.	Malathion	µg/l	UDECA 1657	190		< 0.03
xvi.	Methyl Parathion	µg/l	UDECA 1657	0.3		< 0.03
xvii.	Monocrotophos	µg/l	UDECA 1657	1		< 0.03
xviii.	Phorate	µg/l	UDECA 1657	2		< 0.03

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

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



Table 17
Monthly Report on Chemical Examination of Surface Water

(Nalahs near Mining Area)
September-2018

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	8.27 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	18
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	---
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	394
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.46
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	181.68
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	131.52
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	249.45
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	76.34
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	14.27
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	141.93
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	16.42
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)	0.05	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	< 0.1
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.1
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	4.0	No relaxation	< 0.01

Contd.....



(Contd.....)

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
33.	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
34.	Silver (as Ag)	mg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
35.	Polychlorinated Biphenyls (PCB)	µg/l	UDECA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.06	No relaxation	Absent
	d. Chloroform			0.2	No relaxation	Absent
39.	Phenolic compounds (as C 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	UDECA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	---	---	1600
43.	<i>Escherichia coli</i>	Per100 ml	IS 1622	Absent	Absent	Present
Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
44.	Pesticides residues					
i.	Alpha-HCH	µg/l	UDECA 508	0.01		< 0.01
ii.	Beta HCH	µg/l	UDECA 508	0.04		< 0.03
iii.	Delta- HCH	µg/l	UDECA 508	0.04		< 0.03
iv.	Alachlor	µg/l	UDECA 508	20		< 0.03
v.	Aldrin / Dieldrin	µg/l	UDECA 508	0.03		< 0.03
vi.	Atrazine	µg/l	UDECA 1657	2		< 0.03
vii.	Butachlor	µg/l	UDECA 508	125		< 0.03
viii.	Chlorpyrifos	µg/l	UDECA 1657	30		< 0.03
ix.	DDT and its Isomers	µg/l	UDECA 508	1		< 0.03
x.	Gamma - HCH (Lindane)	µg/l	UDECA 508	2		< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	UDECA 1657	30		< 0.03
xii.	Endosulphan	µg/l	UDECA 508	0.4		< 0.03
xiii.	Ethion	µg/l	UDECA 1657	3		< 0.03
xiv.	Isoproturon	µg/l	UDECA 1657	9		< 0.03
xv.	Malathion	µg/l	UDECA 1657	190		< 0.03
xvi.	Methyl Parathion	µg/l	UDECA 1657	0.3		< 0.03
xvii.	Monocrotophos	µg/l	UDECA 1657	1		< 0.03
xviii.	Phorate	µg/l	UDECA 1657	2		< 0.03

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

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



Table 18

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

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/Mining Area
1.	P ^H (1:5 water extract)	-	6.82 at 25°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	184.7
3.	Texture	-	Silty Clay
4.	Sand	%	36.19
5.	Slit	%	28.42
6.	Clay	%	35.39
7.	Water Holding Capacity	%	31.64
8.	Bulk Density	g/cc	1.27
9.	Porosity	%	12.68
10.	Exchangeable Calcium (as Ca)	mg/Kg	729.16
11.	Exchangeable Magnesium (as Mg)	mg/Kg	146.39
12.	Exchangeable Manganese (as Mn)	mg/Kg	112.64
13.	Exchangeable Zinc (as Zn)	mg/Kg	52.73
14.	Available Boron (as B)	mg/Kg	ND
15.	Water Soluble Chloride (as Cl ⁻)	mg/Kg	481.2
16.	Water Soluble Sulphate (as SO ₄)	mg/Kg	616.9
17.	Available Potassium (as K)	mg/Kg	317.4
18.	Available Phosphorous (as P)	Kg/hect	11.64
19.	Available Nitrogen (as N)	Kg/hect	138.29
20.	Cadmium (as Cd)	mg/Kg	ND
21.	Chromium (as Cr)	mg/Kg	ND
22.	Copper (as Cu)	mg/Kg	0.03
23.	Lead (as Pb)	mg/Kg	ND
24.	Total Iron	mg/Kg	1127
25.	Organic Matter	%	1.26
26.	Organic Carbon	%	0.47
27.	CEC	meq/100g	13.68

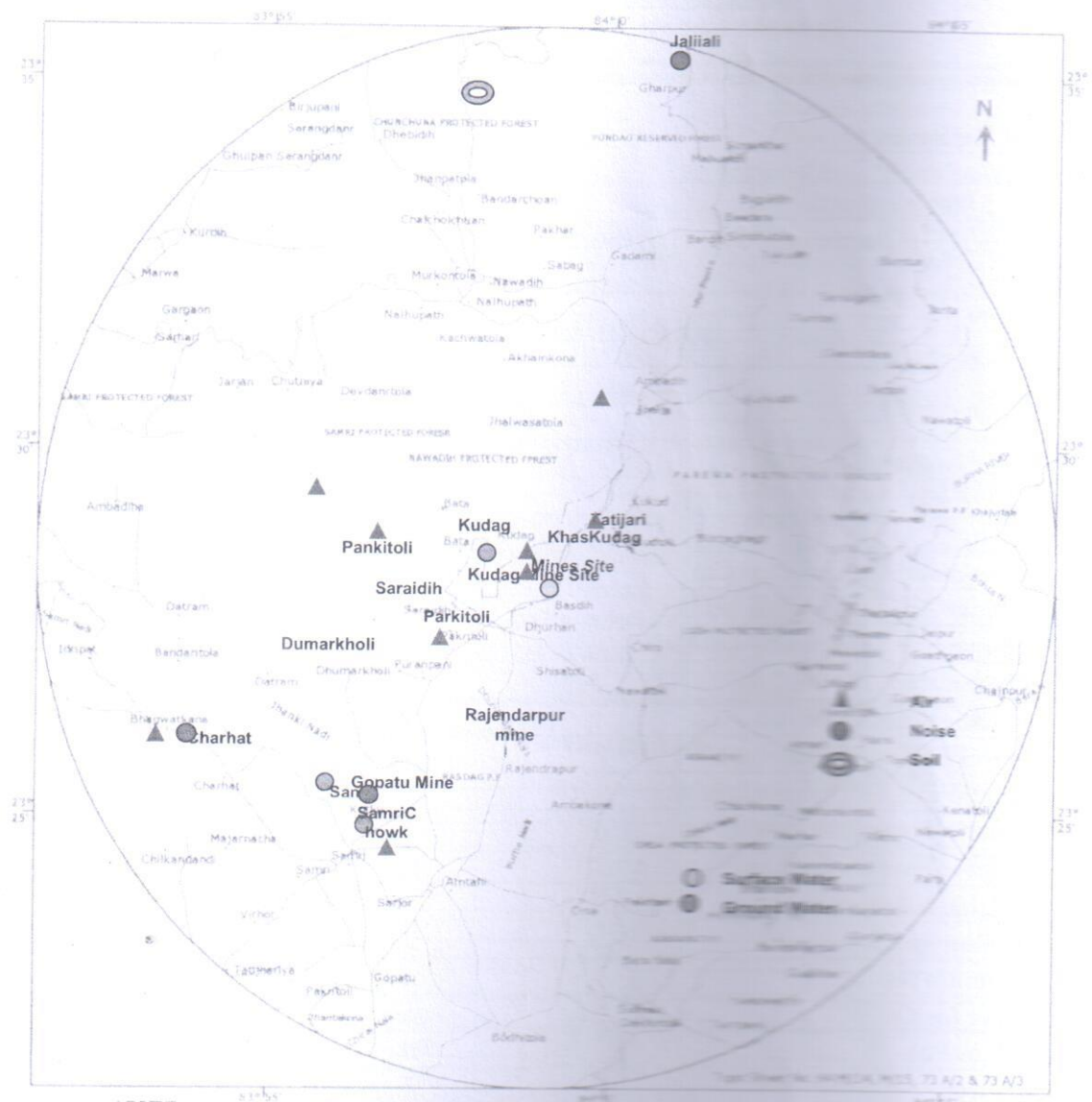
Note: 1. Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. 'mg/Kg' is equivalent to 'ppm'. 4. 'g/100g' is equivalent to '%w/w'. 5. All parameters are in 1:5 water extract.

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



Hindalco Industries Limited
Kudag Mining Environmental Status Report for
July-2018 To September-2018

Details of Salient Features



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

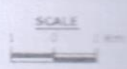


Fig. 10. Sampling locations for Noise and Soil